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Exploring How Three (3) Common Psychological Factors Can Affect Students' Performances While Studying Overseas

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Abstract

This study investigates the influence of three common psychological factors, which are homesickness, cultural differences, and acceptance or fitting in, on the performance of students studying overseas. The study aims to provide detailed knowledge of how these factors can impact academic achievements, adjustments, and the overall well-being of students studying in foreign countries. With a qualitative research approach, the study includes a literature review, data collection, analysis, and interpretation of secondary data from different sources. The findings show that a significant challenge faced by students while studying abroad is homesickness, which leads to emotional distress, concentration problems, reduced motivation, and social interaction disadvantages. Cultural differences can also impose challenges for students as they locate unfamiliar norms, practices, and beliefs that impact their cognitive abilities, emotional well-being, and social skills. Moreover, acceptance or fitting in plays a significant role in the satisfaction and academic success of students with positive acceptance. self-confidence, social competence, and a sense of belonging is promoted. On the other hand, negative experiences can result in lowered self-worth, social isolation, and academic impairments. The study recognizes limitations like reliance on secondary data and emphasizes a limited number of psychological factors. Future recommendations include primary data collection, investigation of interactions between psychological factors, and longitudinal designs. This study reveals the significance of resolving psychological factors for supporting the academic performance and overall well-being of students studying overseas.

Keywords*: Cultural Differences, Fitting -in, Homesickness.*

Introduction

Education and learning are major milestones in any individual's life. Both are said to be continuous and can be referred to as that aspect of life that spans from the "womb to the tomb." This study aims to explore how three (3) common psychological factors, namely, (a) homesickness; (b) cultural differences; and (c) acceptance or fitting in that affect students' performances while studying overseas.

By interrogating the literature, the study will seek to place emphasis on each of these factors and how they can affect students' performances while studying overseas.

Education today is not just in the classroom in your local town or district; a student can opt to study overseas, where the opportunities seem endless. It will expose the student to diverse cultures, foods, religious beliefs, and even different languages.

Whether it is just for a semester or a full degree program in another country, studying abroad can be one of the most rewarding and exhilarating experiences of a person's life. There, they will be exposed to several diverse

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cultures, face new challenges, and have other experiences that will help to open their minds to a whole new world.

A simple definition that can be used to describe studying abroad is “a program that is offered by a university that allows a student to live in a foreign country and attend that university.” Or two universities have an arrangement that allows them to exchange students so that these students can learn about a foreign culture and help to broaden their horizons. Considering all the benefits and glamour of studying abroad, there are some psychological factors as well as environmental conditions that one may not be used to that may work against them, such as the different climate conditions, food and beverages, and languages. Considering its wide scope, this paper will focus on only these three (3) common psychological factors: (a) homesickness, (b) cultural differences, and (c) acceptance or fitting in.

An Overview of the Three Common Psychological Factors

The three (3) common psychological factors that the researcher is exploring are (a) homesickness, (b) cultural differences, and (c) acceptance or fitting in, and how they can affect the performance of students while studying overseas.

Homesickness

No matter how much you argue and fight with your families while living together, the moment you have been gone for a few days, you started to miss them, their constant bickering and noise, and their troublesome ways, especially if you have a younger sibling who is constantly giving you trouble [1]. There and then, homesickness starts to sink in. In other words, “homesickness” may be defined as the distress caused by being away from home. It is a mixture of anxiety and depression; homesickness is not a sign of weakness but rather a consequence of the stability and attachment of the home.

Cultural Differences

Living in a foreign country all by yourself can be quite daunting and can have an impact on your daily routine. Cultural differences may be defined as the different beliefs, behaviors, languages, practices, and expressions considered unique to members of a specific ethnicity, race, or national origin.

Cultural diversity is especially important in today’s global arena [2]. We can learn from one another, but first, we must have a level of appreciation and understanding for each other to facilitate this kind of collaboration and cooperation.

Acceptance (fitting in)

Finding the right clique, gang, or making friends abroad as an international student can be much more difficult than in your own country due to certain external factors such as language barriers or race. Acceptance, or fitting in, simply means to be accepted into a group of people as a member of that group. As an international student far away from home, you will want to feel like you belong or are accepted. Fitting in or being accepted will make making friends easier; don't get judged for being different from an international student.

Literature Review

Psychology is among many things that affect humans' day-to-day activities. The success or failure we face in the various activities we perform each day most often depends on our everyday psychology. As such, people can suffer from various psychological problems that severely disrupt their daily functioning on various occasions [3]. These problems emanate from psychological factors such as stress, anxiety, depression, lack of motivation, loneliness, culture shock, helplessness, and phobias. These psychological problems can lead students in higher education institutions to fail in their academic achievements due to test anxiety, deficient performance, low self-

confidence, unrealistic worry, and fear or uneasiness that interfere with their ability to function normally.

Homesickness

Based on the exploration of the three psychological factors, homesickness can be regarded as a feeling of longing for one's home during a period of absence from it. [4] confirmed this definition by stating that homesickness may be defined as the distress caused by separation from home. [5] pointed out some of the common traits of homesickness, such as loneliness and missing friends and family, which can have a negative impact on students' performances. [6] Based on research, all believe that feelings of homesickness can lead to difficulties in focusing, depression, anxiety, withdrawal, physical health problems, and socio-cultural adjustment issues.

In addition, they stated that it is heavily influenced by factors such as discrimination and social disconnect, and if these factors are left unchecked, they could lead to unfortunate consequences for students adjusting to academic life. According to [7], they are of the opinion that homesickness can also influence academic performance, which is detrimental to completing college.

Cultural Differences

Culture is not just about languages, food, appearances, and private habits. It can portray deep perceptions, beliefs, and values that influence one's way of life and, therefore, the way one views his or her surroundings. According to the international student website, one of the most common challenges for students studying abroad can be cultural differences (culture shock). [8] stated that a simple definition may be the feeling of disorientation experienced by someone when they are suddenly subjected to an unfamiliar culture, way of life, or set of attitudes. This may cause students to have symptoms such as sadness, loneliness, melancholy, preoccupation with health, changes in sleep habits, changes in mood, loss of identity, lack of confidence, and longing for family, according to the website. Additional factors that contribute to cultural differences or shock, according to the website, are climate, language, social roles, rules of behavior, values, and relationship stress.

Acceptance (Fitting In)

An article in Psychology Today by Joanna Cannon, dated July 13, 2016, reiterates that we all want to feel accepted and fit in. The need for acceptance may be a basic human instinct, although some value it quite differently from others. We all want to fit in and feel like we belong. To achieve that, we often present slightly different versions of who we are, depending on the environment and the company we are in [9]. We might have numerous "editions" of ourselves—for work, reception, or online. We often tweak and modify ourselves to be accepted in a particular situation, setting, or group. However, one may question whether we are being accepted for who we truly are or merely for the version we elect to present ourselves.

According to [10], this duplicity works very well for most of us, but some people only have one version of themselves. They are unable, or unwilling, to sandpaper themselves down to fit society's expectations, and because their behavior or appearance does not quite match the herd, they are pushed further and further to the periphery of a community.

These are the goats all around us, stitched into the landscape of everyone's day, waiting at bus stops and standing in line at the supermarket. We use quite different tactics, even unconventional methods at times, to separate the goats from the sheep. Their hair could be a touch too long, and their clothes could be a touch unconventional. They may choose to live their lives in a way we don't recognize in ourselves.

Methods

For the exploration of the impact of the three common psychological factors—homesickness, cultural differences, and fitting in or acceptance on the performance of students while studying in other nations, a qualitative research approach will be used.

Literature Review

This section conducts a detailed review of past research studies, reports, academic papers, and relevant literature on the topic. In the literature review, electronic databases will be searched for reputable sources and academic journals to identify relevant studies that have explored psychological factors and their implications for students studying overseas [11]. Main databases include Google Scholar, PubMed, and Eric.

Data Collection and Compilation

gathering relevant data and information from the sources identified. This may involve data on the incidence and prevalence of homesickness, acceptance, and cultural differences among students studying overseas, as well as data on academic performance [12]. Collecting relevant statistics, quality findings, case studies, and the rest of the information gives information on psychological factors and their impact.

Data Analysis

Analysis of the gathered data and information for identification of patterns, themes, and trends related to psychological factors and their influence on the performance of students This analysis can include categorizing the data based on geographical location, duration of study, cultural context, and academic discipline. Identifying common themes and key findings from the secondary data.

Synthesis and Interpretation

Synthesizing the findings from the data analysis and interpreting the results about the research question and objectives identification of the strengths and drawbacks of the existing studies and taking into concentration any conflicting findings or gaps in the literature [13]. Providing a detailed overview of the influence of homesickness, cultural differences, and acceptance on the performance of students based on secondary data.

Limitations and Recommendations

Some of the limitations involve the lack of primary data and the diversity of sources and methods used in the present study. There is also the possibility of errors or biases in the data collection and analysis. The last limitation is related to the generalizability of the findings to different populations or contexts. Some of the recommendations involve doing primary research with students studying overseas using longitudinal designs or mixed methods. It is recommended to explore the rest of the psychological factors that may impact performance and compare the findings of different strategies for mitigating the psychological challenges.

Results

Based on secondary data and interrogating the literature, the following results were noted:

Homesickness

Based on secondary data, the effect of homesickness is and can be very harmful since the major goal of all students studying overseas in a foreign country is to graduate with distinction and honors. Homesickness can lead to deficient performance, and in some cases, the student can even fail to graduate. This problem must therefore be addressed for students to benefit from studying overseas.

Cultural Differences

The literature stated that students studying overseas often suffer from cultural differences because they feel a sudden lack of home support and a familiar environment.

The students may see the new environment as irrational, unpleasant, or even hostile. In addition to those, the students may lack language or people skills to get accustomed to a new culture.

Acceptance (Fitting In)

This is an adjustment most students don't anticipate or cope with well. Many students have a challenging time making friends or finding the right group to fit in with or study with. This may be a result of a language barrier or other customs to which they are not accustomed. As a result of not fitting in or being accepted, this often leads to loneliness, depression, or other serious disturbances such as drugs.

Discussion

The aim of the study is to explore three common psychological factors that can impact the performance of students while studying abroad. The study utilized a qualitative research approach and did a literature review, data collection and compilation, data analysis, and interpretation of the secondary data from various sources [14]. The study found that psychological factors have a major impact on the academic accomplishments, adjustments, and well-being of students studying overseas.

Homesickness turned out to be one of the most challenging and common psychological factors impacting students when they leave their home nation and study in a new environment. This factor can lead to emotional distress such as loneliness, anxiety, depression, low self-esteem, and nostalgia that can interfere with the motivation, concentration, and learning outcomes of students. The physical health of students can also be affected by homesickness symptoms such as appetite changes, sleep problems, fatigue, and headaches [15]. Further social interactions of the students can also be impacted by homesickness, such as reduced willingness to participate in class activities, make friends with locals or the rest of the students, and join clubs or societies. Therefore, homesickness can adversely impact the academic performance and overall satisfaction of students studying abroad.

Cultural differences are another psychological factor encountered by students while they study abroad. Cultural differences can be referred to as the different norms, values, beliefs, languages, customs, and behaviors that make up the characteristics of a country or region. Cultural differences can pose different challenges for students who have adapted to an unfamiliar and new culture while protecting their own cultural identity. Cultural differences can lead to cultural shock, which is a process of feeling frustrated, confused, disoriented, or overwhelmed by the new culture [16]. Culture shock can impact the cognitive abilities of students by impairing their problem-solving skills, memory, and creativity. Culture shock can also impact the emotional status of students, such as irritability, mood swings, anger, or sadness. Moreover, culture can impact social skills, resulting in them feeling insecure, misunderstood by others, or isolated. Therefore, cultural differences can have an adverse impact on the academic performance of students while they study abroad.

The third psychological factor was acceptance, or fitting in. This is encountered by students when they study overseas. Acceptance of fitting in can have a negative or positive impact on the students' reliance on the way they perceive and react to their social environment. On the one hand, acceptance of fitting in can be beneficial for students, who feel welcome and supported by their classmates and peers. Acceptance can enhance self-confidence, self-efficacy, and self-esteem. It can also promote social competence by enhancing communication skills, teamwork abilities, and intercultural awareness.

Therefore, acceptance can have a positive impact on the academic performance and happiness of students. It can also have harmful effects on students who feel discriminated

against, rejected, or isolated by others. It can result in lowering students' self-worth, identity, and self-respect. It can impair social development by reducing social support, social networks, and social capital among students. Moreover, acceptance of fitting in can limit the academic achievements of students by causing them to experience academic anxiety, stress, or depression. Therefore, it can have a negative impact on the academic performance and overall well-being of the student studying in a foreign country.

There are several limitations to the study that need to be acknowledged. To begin with, the study is dependent on secondary data analysis that may not reflect the present perspectives or situations of students studying overseas [17]. Secondly, it used a qualitative research approach and did not provide quantifiable or generalizable findings that could be compared in various contexts or populations. Thirdly, the study emphasized only three psychological factors that may not cover the full range of factors influencing the performance of students studying overseas. Fourthly, the study did not take into consideration the possible interactions or moderating effects of such psychological factors on one another that may impact the performance of the students.

There are also several implications and recommendations for future research. To begin with, the study recommends that psychological factors are crucial determinants of the performance of students studying overseas. So future research should continue to discover these factors and their implications using various methods, samples, and data sources. Furthermore, the study shows that the psychological factors are not static but are changeable over time and dynamic [18]. Therefore, research should include cross-sectional designs for capturing the evolutions or variations in such factors and their effects on the course of study programs abroad. Moreover, the study implies that physical factors are not isolated but are interrelated and impacted by other factors like institutional, personal, and environmental factors. So future research should investigate the complex interactions and relationships among these variables and their effects using multilevel or multivariate analysis. Lastly, the study reveals that psychological factors have positive as well as negative effects on students' performance. Therefore, research in the future should determine and analyze the probable strategies or interventions that can improve the positive effects and counter the negative effects of such factors on students' performance.

Conflicts of Interest

It is significant to have knowledge of potential conflicts of interest that may arise related to this research. Conflicts of interest can arise when there is a misalignment between the personal or financial interests of researchers and the objective and non-prejudiced conduct of the study. In this research, the effect of psychological factors on students studying overseas is probable, and conflicts of interest can involve:

Personal Bias

The involved researchers in this study may have personal experiences that could impact their data interpretation and selection of sources. For instance, if a researcher had an adverse experience studying abroad, they may tend to focus on the negative impact of psychological factors on the performance of students. To overcome this probable conflict of interest, researchers should try to maintain objectivity and reduce personal biases. We should approach the research with an open mind and critically evaluate the evidence to ensure our personal experiences or opinions do not influence the findings unduly.

Funding Bias

If the research is funded by an organization or entity with an interest in a specific outcome, there is a probable conflict of interest. For

example, if a study exploring the influence of homesickness on the performance of students studying abroad is founded by a company that deals in offering counseling services to homesick students, they may be more inclined to focus on the homesickness' negative impacts. To mitigate funding bias, researchers should disclose any financial affiliations or relationships that could impact the findings of the study [19]. Ensuring transparency in funding sources helps maintain the integrity and credibility of the research.

Publication Bias

This can occur when researchers or academic journals selectively publish studies with significant or positive findings while overlooking studies with non-significant or negative results. This can cause an over-presentation of certain perspectives and skew the overall understanding of the topic. To mitigate publication bias, researchers can intend to publish their findings with their respective results. In addition to this, academic journals should be committed to publishing a diverse range of studies to provide a balanced view of the research topic.

Recommendations and Conclusion

Based on the three (3) common psychological factors (a) homesickness, (b) cultural differences, and (c) acceptance or fitting, the following recommendations were noted:

Homesickness

According to [20], a key component of addressing homesickness or loneliness is to try to be social and get involved. Socializing with local students prevents homesickness, as the more international students mingle with local students, the less homesickness they experience [6]. Other ways of limiting or eliminating homesickness are listed below:

1. Thanks to technology, you can now stay in touch with your loved ones through Skype, WhatsApp, FaceTime, etc. These allow you to see your loved ones at any time of the day (or night).
2. Make use of international calling cards where you need to pay a monthly charge for free unlimited calling to a large number of countries.
3. Visit a local restaurant that serves dishes from your home country.
4. Stay away from social media and stop surfing through year-old pictures.
5. Involve yourself in interesting activities to keep your mind productive.

Cultural Differences

It is a good opportunity to allow one not only to restrict a single set of ideologies but also to figure out different styles of ideologies and concepts. However, some students find it difficult to adjust to a different culture, and as such, it can hinder their progression.

The best way to deal with cultural issues is to keep an open mind when meeting new people. If it is the language aspect of the culture (language barriers) that is holding you back, enroll in a language class if your schedule permits, or try out special apps like Duolingo that will help you understand different languages. Another way to deal with cultural differences is to cast your fear aside and interact with the locals or attend local events and cultural festivals.

Acceptance (Fitting In)

Feeling left out can cause someone to become depressed, sad, or even lonely. Studying abroad away from your close family, friends, and loved ones and entering a strange country without feeling welcome or accepted can be challenging. Listed below are some ways you can help overcome the feeling of being unaccepted or not fitting in.

1. Give yourself some time to get over the feeling of "unwantedness." Instead, be yourself and don't lose your basic nature or your sense of humor. Politeness, kindness,

and the ability to make people laugh are traits that work like charm, no matter which part of the world you might be in.

2. Participating in group activities and joining student societies are good icebreakers. You might even find groups of your community in a faraway country where you will have the prospect of satisfying yourself, hanging around with fellow countrymen, and sharing your fears and concerns with people who can identify with you.
3. Another great way to make friends is to initially engage in small talk by asking for help.

Studying overseas will expose the student to a new ambience and an environment that can create a challenge for them. Even if a student knows a lot about the country where he is going to live, there is a probability that he will be treated differently. Eating habits, though they sound extremely trivial, are often the root cause of discomfort. One can feel homesick, lost, or alienated.

Furthermore, studying in a different language is often a frightening obstacle that a lot of students won't be ready to overcome. Also, making good friends does take time, and it is often harder in a country where you simply aren't very willing to. However, it is often an outstanding opportunity for international exposure, learning a unique language and culture, traveling aficionados, employment opportunities, scrupulous knowledge of areas of interest, and research activities.

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The Psychological Impact of COVID-19 on Healthcare Professionals in FCT, Abuja, Nigeria

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Abstract

A Coronavirus (COVID-19) outbreak characterized by fever, dry cough, fatigue, and with occasional gastrointestinal symptoms was initially reported in Wuhan, China, highly infectious and a mortality rate around 10%–15%. In Nigeria and FCT, the disease was confirmed on the 27th of February and 20th of March 2020 respectively. The objectives were to determine the epidemiological characteristics and transmission of COVID-19, to assess the socio-medical responses to COVID-19 in FCT, to recommend the mitigation and intervention strategies to the states and Nigeria as a whole and even globally. The study design was retrospective, 385 individuals were randomised selected in the study areas. The responses were analysed using Statistical Package for Social Sciences (SPSS) version 20. Confirmed cases was 23,239, 72 deaths, and a cumulative incidence (CI) was 6.7/ 100, 000 and a Cumulative Fatality rate (CFR) of 0.30%. Testing for the disease and vaccine uptake in FCT was very low and the psychological impact of COVID-19 on health workers was significantly very high, levels of depression, anxiety, worried about having enough to eat next week and worried about household finances was their major concern. The result reveals that 77.4% were depressed, 31.9% were nervous, 54.3% were worried about what they will eat next week and 66% were worried about their household finances.

Keywords: *COVID-19, Psychological Impact, HCWS, FCT.*

Introduction

Background: An outbreak of a mysterious virus causing pneumonia occurred in late December 2019 and characterized by fever, dry cough, fatigue, and occasional gastrointestinal symptoms. It was epidemiologically associated with a seafood and animal market, the Huanan Seafood Wholesale Market, in Wuhan, Hubei, China [1]. The disease was deemed to be zoonotic in origin, from bat. This is the deadly third-generation virus in the Corona family preceded by Middle East Respiratory Syndrome (MERS) in 2012 and severe acute respiratory syndrome (SARS) in 2003. After Rhinoviruses, Coronaviruses are ranked as the main cause of the commonplace cold without triggering any sickness [2]. In 1937, the primary coronavirus was in bats, rarely affecting humans and mostly circulating among animals like bats, camels, and cats. Later, they mutated to contaminate rats, cattle, pigs, mice, cats, dogs, horses, and turkeys [3].

However, because of mutation change, it had acquired the capacity to transfer from human to human through the air droplet after coughing and

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sneezing from an infected person. The mortality rate caused by the virus was around 10%–15%. [4,5] Even if the transmission dynamics are not completely understood and significant knowledge gaps still need to be filled [6]. An individual can get infected through touching infected surfaces then touching the face, eyes, nose, and the mouth.[7] The virus causes less severe symptoms than Ebola but has a high competence of infection. The disease was officially named as Coronavirus Disease-2019 (COVID-19) by W.H.O on February 11, 2020. It was also named Severe Pneumonia with Novel Pathogens on January 15, 2019, by the Taiwan CDC, the Ministry of Health and is a notifiable communicable disease of the fifth category. COVID-19 is a potential zoonotic disease with a low to moderate (estimated 2%–5%) mortality rate. The WHO issued a public health emergency of international concern (PHEIC) alarm on January 30, 2020. By the beginning of March 2020, it was identified as a pandemic (WHO, 2019). Consequently, WHO highlighted the excessively high burden on healthcare professionals (HCPs) and called for intervention to address the immediate needs so as prevent serious impacts of this outbreak on both physical and mental health of these health care providers. The outbreak of COVID-19 has currently spread widely to more than 120 countries and territories [4,5]. The virus belongs to the family Coronaviridae, and subfamily of Coronavirinae and belong to the order Nidovirales, and the realm Riboviria [8]. Seven human coronaviruses (HCoVs) are listed as follows: ARS, ERS, SARS-CoV-2, HCoV−229E, HCoV−OC43, HCoV−NL63, HCoV−HKU1 [9]. An unprotected hospital staff that was exposed to patients' droplets or through contact is prone to be infected and nosocomial infections ensue, and this stresses the importance of good infection prevention and control [10]. The spread is coming currently in waves, up to the fourth wave. Improved public safety response by early event identification, suspicious accidents monitoring, contact tracking and improved airport security, public awareness and safety staff caution are some of the intervention techniques proposed against the spread to other territories [11]. Only familial clusters but also outbreaks in ocean liners, especially cruise ships were reported. As of 29th March 2021, the global spread of confirmed cases was 126,890,643 million and 2,778,619 deaths. In Nigeria, confirmed cases were 162,641 with 2,049 deaths as of 30th March 2021 [7].

For comprehension of viral pathogenicity, determining the number of particles that trigger infection is crucial. A low infectious dose could mean the organism is highly transmissible from person- to-person and via touching contaminated surfaces. The main method for defining the infective viral dose is through studies utilizing dilution of virus studies for cytopathogenic effect (CPE) in 50% of inoculated culture cells (known as tissue culture infectious dose, or TCID50), or by counting plaque-forming units each plaque in a layer of host cells indicating colonization by a single virus particle (PFU) (12). TCID50 is the viral dose that induces either pathological changes or cell death in 50% of inoculated tissue cultures. The infectious doses for SARS-COV1 are slightly higher than a hundred but that of 2019-nCoV is not clear.

As the outbreak has become pandemic, the frontline walkers who were the HCPs become overwhelmed and psychologically distressed and began to propagate, and quickly expanded and are directly or indirectly involved in the consulting, diagnosing, treating, and caring for patients with COVID-19, and are therefore at high risk of contracting the infection [13]. FCT and Nigeria as whole faced specific challenges for preparing for the pandemic: in a context of bad governance and an alarming situation, patient facing HCWs in FCT, in Nigeria, AFRICA and even globally were in danger of developing psychological distress. The incremental trend of confirmed and suspected cases, overwhelming remaining tasks at hand, inadequate personal protective equipment (PPE), broad media inclusion with daily announcement

of whole global figures of infection rate, absence of explicit medication and feelings of being ineffectual may all add to the psychological burden. In a developing country like Nigeria and FCT, Low health sector budget, unemployment, low literacy rate and failure to deliver impartial health services at all sectors add cumulatively to the misery especially during this pandemic. Weak Health system and corrupt political and economic fragility, high inflation rate, severe insecurity, kidnaping and banditry, resulted in inadequate preparation in the protection of HCPs and decreasing motivation and support among HCPs [14, 15]. Among the factors reported to contribute to the mental health burden of these healthcare workers are the overwhelming spread of the life-threatening disease, the virulence of the Virus , the gradual increase in numbers of newly diagnosed and suspected cases, the surge in mortality rates, the fear of becoming infected and transmitting the infection to their loved ones, the increase in patient getting infected increase the workload, the potential lack of personal protective equipment (PPE), the depletion of certain drugs, the lack of a specific treatment, and feelings of being inadequately supported [16] all were contributing factors to the psychological impact. Accordingly, it has been reported that during previous viral outbreaks, HCPs endured a high degree of both physical [17] and mental stress during and even years after the end of epidemics [18]. The current pandemic has had several psychiatric consequences among healthcare practitioners who treat patients with confirmed or suspected COVID-19 infection.[19] Clearly, HCPs should be regarded as a high-risk population because of their higher anxiety, depression, and worries compared with the general population [20]. This occupational health stress in HCPs is a very great hazard, for it may adversely affect the quality of healthcare (QoC) provided to patients.

In a various study done in many different countries, revealed that the prevalence of mental health complications associated with COVID-19 pandemic [21] is enormous. The magnitude documented is the psychological burden among healthcare workers and the risk and protective factors have been identified. [22,23] For instance, an Italian cross-sectional survey-based study with a retrospective assessment showed that the COVID-19 outbreak led to life changes in Italian healthcare workers in terms of increase in negative mood, worry, loneliness, fatigue, restlessness, and decrease in happiness [24].

Addressing the needs of frontline HCPs during the COVID-19 pandemic is an important priority.[25] Accordingly, the aims of our study were to screen HCP for their mental health by looking into depression, anxiety, Worries, Economic effect of covid-19 among HCWs and means of livelihood for the families. Findings from this work will help to maintain a sustainable, effective, and efficient healthcare response to the outbreak while safeguarding the wellbeing of HCPs in FCT-Abuja and our country as a whole and else the rest of the HCPs globally.

Materials and Methods

Study Design

The methodology of this study is a retrospective study with a sample size of 385 healthcare workers participated in both Tertiary and secondary Health facilities.

Study Population

All participants aged 18 years and above that were HCPs participated, provided their written consent on the questionnaire before responding to the questions. Those who agreed were directed to the questionnaire, and those who declined automatically exited the survey. The inclusion criteria included all health care workers but the exclusion of the administrative staff. Respondents were recruited irrespective of gender, cultural background, or origin.

The questionnaire was a hand –delivering, self-administered questionnaire that is to be filled out by the respondent and collected later. The questionnaire has different sections: Assessment of Covid-19 like symptoms, Covid-

19 Testing, Assessing preventive measures (social distancing, Wearing mask, Hand washing) Vaccine Acceptance, basic demographic information such as age (years), gender (male or female), occupation, accommodation, psychological history, type of hospital (Secondary Care Centre and Tertiary Care Hospital), Assessing Covid-19 psychological impact on Health Care Providers (HCPs) and use of phone and sources of information.

Sample Size Determination

Minimum sample size is determined by using the Cochran formula, which is as shown below, and this Cochran's formula allows the calculation of an ideal sample size given a desired level of precision, a desired confidence level, and the estimated proportion of the attribute present in the population.:

Where: e is the desired level of precision (i.e., the margin of error),

p is the (estimated) proportion of the population which has the attribute in Question,

q is 1 – p.

The z-value is found in a Z table which is 1.96. P Value = 0.5.

95% confidence, and at least 5% — plus or minus — Precision. A 95 %.

Confidence level gives us Z values of 1.96, per the normal tables, so we get (1.96)2 x 0.5 x (1-p)/0.052.

(3.8416) x 0.5 x (1- 0.5) / (0.0025).

(3.8416 x 0.5 x 0.5 /0.025.

= (3.8416 x 0.25) / 0.025 =385.

So, a random sample of 385 participants been the target population and will be enough to give the confidence levels needed. 385 questionnaires were administered to the respondents in the study area of FCT, Abuja. However, the sample size used for the survey was 385 to consider any incomplete and non-response data.

Sampling Technique

The two secondary and one tertiary health care institution in the state were purposively selected: FCT University Teaching Hospital Gwagwalada and Maitama and Wuse District Hospital Using simple random sampling techniques,

Data Collection and Analysis

Data was collected using a structured, self-administered questionnaire from October 14 to December 15, 2021. A questionnaire of University of MARYLAND, USA survey to provide a set of the comparative effect of the impact of the novel pandemic was adapted. All participants were aged 18 years and above and they provided their written consent on the questionnaire before responding to the questions. Those who agreed were directed to the questionnaire, and those who declined automatically exited the survey. The questionnaire was a hand–delivered, self-administered questionnaire that was filled in by the respondent and collected later. The questionnaire extracts basic demographic information and vaccine acceptance. Individual identification information was not collected, because the survey was completely anonymous. After administering the questionnaire and the response obtained from the respondents was kept under secure server. All responses were gathered and were treated with all confidentiality. The level of significance is 5%. A pilot study was carried out among 31 health care providers of Gwarimpa General Hospital, FCT, Abuja where participants was also randomly selected for clarity, acceptability, and readability. Finding from the field data collection after analysing agreed with the result from the field pilot study conducted at Gwarimpa General Hospital in all the thematic area covered.

Psychological Impact Questions

The psychological question investigated were Depression, Anxiety/Nervous that nothing could calm them down, worried that they or someone in their immediate family may become seriously ill or Worried on having what to eat next week

and how worried they are about their household finances in the next coming week(s).

Statistical Analysis

All data were analysed with SPSS statistical software, version 20.0. The psychological symptoms of depression, anxiety/nervous that nothing could calm them down, worried that they or someone in their immediate family may become seriously ill or Worried on having what to eat next week and how worried are they about their household finances in the next coming/subsequent week(s) were assessed. Univariate analysis was used to evaluate candidate predictors of mental health disorders. The significance level was set at p - ≤ 0.05, 95% confidence interval.

Ethics Statement

This study was approved by the FCTA Health Research Ethics Committee (FHREC /2021/01/100/24-08-21). Individual written / informed consent was also obtained from the respondents before the questionnaire was to be answered. All information sought was handled with utmost confidentiality and in accordance with the Declaration of Helsinki.

Results

Table 1. Socio Demographic Characteristics of the respondents (N=385)

Socio Demographic Characteristics	**n (%)**
Age Group	
18-24 years	73 (19)
25-34 years	116 (30.1)
35-44 years	51 (13.3)
45-54 years	92 (23.9)
55-64 years	35 (9.1)
Missing	18 (4.7)
Gender	
Male	132 (34.3)
Female	234 (63.8)
Missing	19 (4.9)
Area where you are staying	
City	139 (36.1)
Town	196 (50.9)
Village or rural area	31 (8.1)
Missing	19 (4.9)
In the last 7 days, did you do any work for pay, or do any kind of business, farming, or other activity to earn money, even if only for one hour	
Yes	215 (55.9)
No	156 (40.5)
Missing	14 (3.6)
Before February 2020, were you working for pay, or doing any kind of business, farming, or other activity to earn money?	
Yes	271 (70.4)
No	100 (26.0)
Missing	14 (3.6)
What is the main activity of the business or organization in which you	

work?	
Agriculture	28 (7.3)
Buying and selling	10 (2.6)
Construction	6 (1.6)
Education	6 (1.6)
Health	297 (77.1)
Personal Service	1 (0.3)
Professional / scientific / technical activities	1 (0.3)
Transportation	1 (0.3)
Other	11 (2.3)
Missing	24 (6.2)
How many people slept in the place where you stayed last night (including yourself)?	
1-3 people	s184 (47.8)
4-7 people	90 (23.4)
8-10 people	9 (2.3)
More than 10 people	27 (7)
Missing	49 (12.7)
In the place where you are staying, how many rooms are used for sleeping?	
1 room	71 (18.4)
2 rooms	104 (27)
3 rooms	136 (35.3)
4 rooms	36 (9.4)
5 or more rooms	18 (4.7)
Missing	20 (4.2)

Source: Author, 2021

Table 1 present the socio-demographic characteristics of health workers sampled in both tertiary and secondary health facilities in FCT. The results showed that 116 (30.1%) of the health workers were between the age of 25 and 34 years while 35 (9.1%) were in the age bracket of 55 to 64 years. In addition, 234 (63.8%) of the surveyed health workers were female while 132 were males (36.2 %.). Also, not less than half (50.9%) of the health workers reported to be staying in FCT Metropolis (town) while 139 (36.1%) reported to be staying in the (outskirts of Abuja) city clusters of FCT. Moreover, 335 (87%) were staying in urban area of FCT while 31(8.1%) were in the rural area).

Similarly, more than half (55.9%) of the health workers reported to be working for pay in the last 7 days, did you do any work for pay, or do any kind of business, farming, or other activity to earn money for at least one hour. Furthermore, the result showed that 271 (70.4%) of the health workers surveyed were working for pay, or doing any kind of business, farming, or other activity to earn money before February 2020.

The result showed that 297 (77.1%) respondents reported that they currently work with health- related organization or business while 28 (7.3%) respondents currently working in agricultural related organization. In addition, the result revealed that 287 (74.6%) respondents reported that they were working in health-related activities before February 2020 whereas 25 (6.5%) were working with agriculture related organizations before February 2020.

Also, 184 (47.8%) of the respondents reported that between 1 to 3 people slept in the place where they stayed last night; 90 (23.4%) of the

respondents reported that between 4 to 7 people slept in the place where they stayed last night meanwhile 27 (7%) of the respondents reported that more than 10 people slept in the place where they stayed last night. In summary about 50.4% of FCT residents sleep in overcrowded rooms, which will favor the spread of COVID.

19. Moreover, 136 (35.3%) of the respondents reported that three (3) rooms were used for sleeping where they are staying; 104 (27%) respondents reported that 2 rooms were used for sleeping where they are staying while 71 (18.4%) of the respondents reported that a room was used for sleeping where they are staying. (If 18.4% HCP were having only one room for sleeping in FCT the capital of Nigeria then what is happening in other states? This means social distancing will not be practicable, if 18.4% HCP were having only one room for sleeping in FCT the capital of Nigeria then what is happening in other states? This means social distancing will not be practicable.

Psychological Effects of COVID-19

Findings from the study revealed that more than half (63.9%) of the health workers were nervous that nothing could calm them down any time. Also, 13.5% of the health workers were nervous that nothing could calm them down a little of the time. Moreover, the study showed that 8.8% of the health workers were some of the times nervous that nothing could calm them down (Figure 1). The level of nervousness among HCWs was 31.9%.

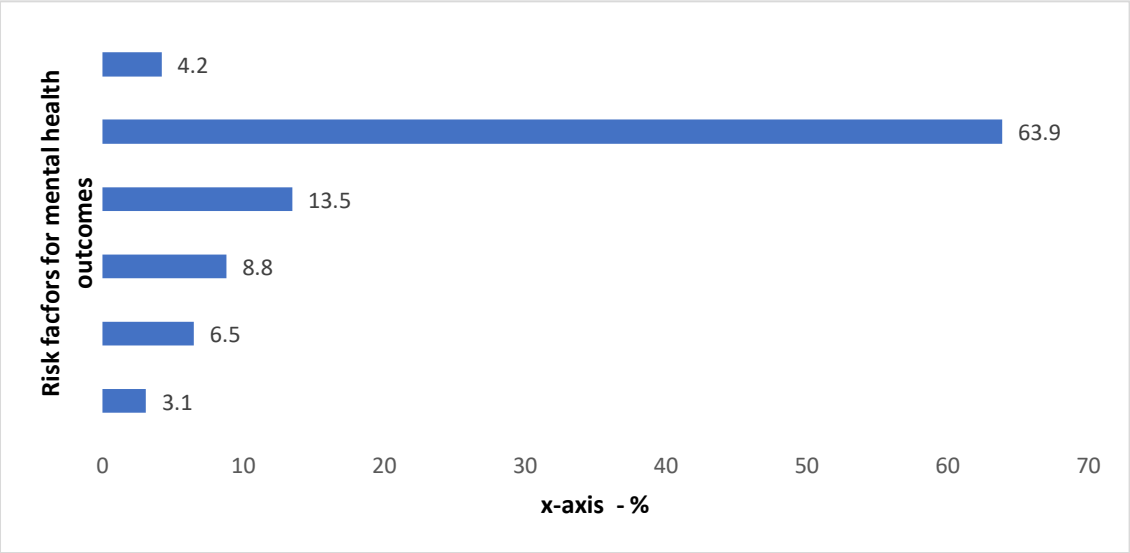

Figure1. Distribution of How Often Respondents Feel So Nervous that Nothing Could Calm Them Down

Furthermore, from this study about half (44.9%) of health workers were not too worried that nothing could cheer them up. Also, 19.5% of health workers were very worried that nothing could cheer them up. In addition, 18.4% of the health workers reported not to be worried at all that nothing could cheer them up**.** In summary 82.8% of HCP feel so depressed that nothing could cheer them up.

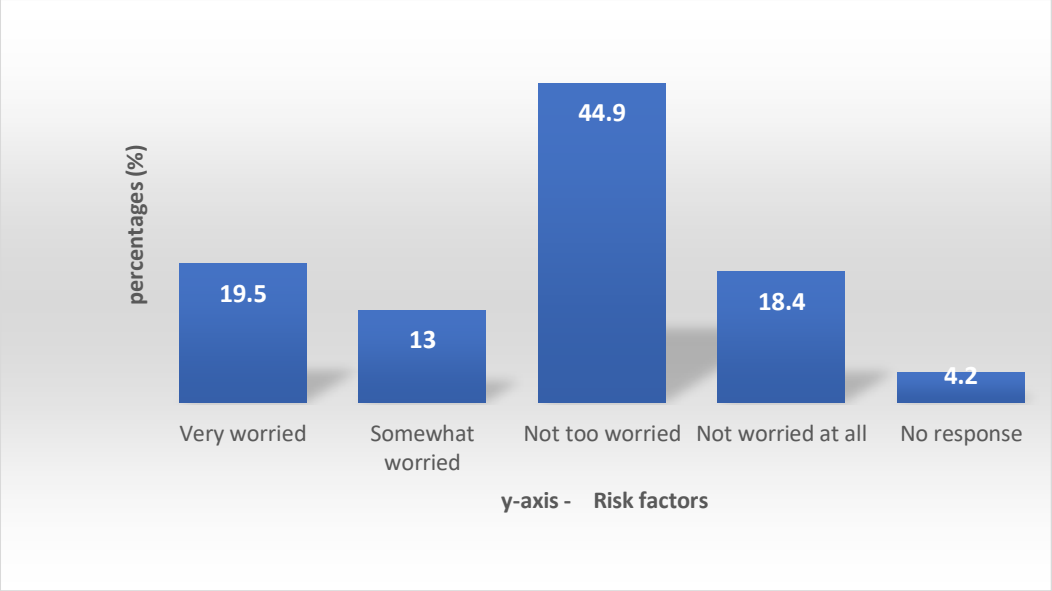

Figure 2. Distribution of How Often Respondents Felt So Depressed that Nothing Could Cheer Them Up

Moreover, the study found that 40.8% of health workers surveyed were not worried at all about having enough to eat one week after the survey. In the same manner, 26.2% of health workers were not too worried about having enough to eat a week after the survey. On the contrary, 18.4% of health workers were very worried about having enough to eat a week after the survey (Figure3). In summary 54.3% of health care workers were worried about what they will eat in the next week.

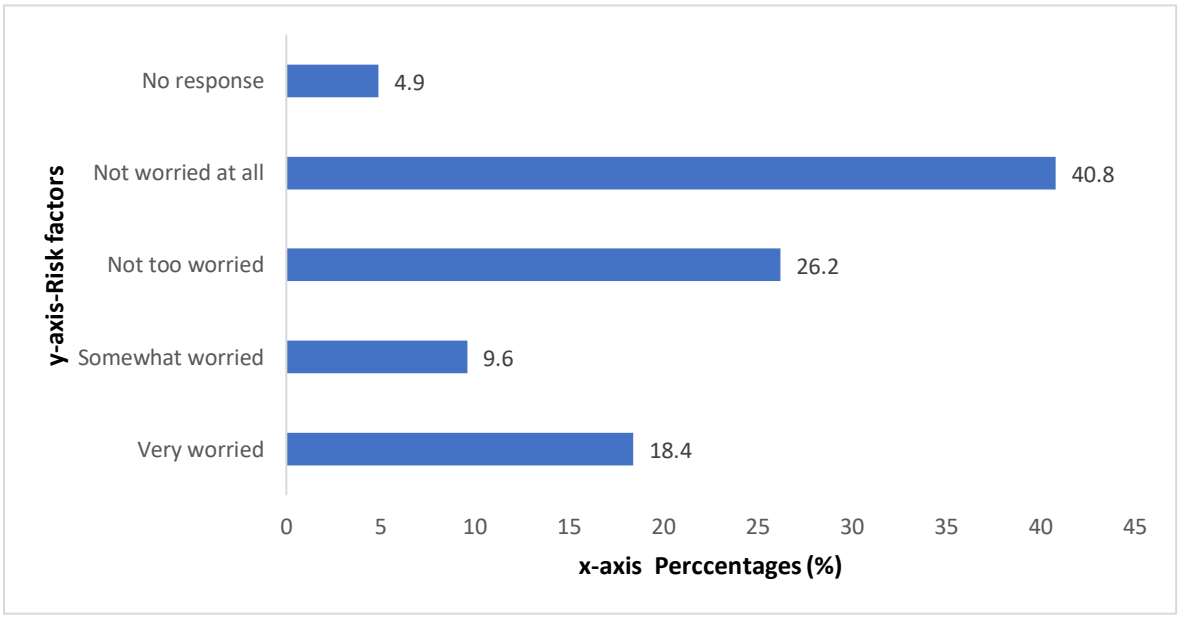

Figure 3. Distribution of How Worried Respondents Were About Having Enough to Eat Next Week

In this study less than half (30.7%) of the health workers were not too worried about their household finance while 29.6% reported not being worried at all about the household finances. In addition, the study revealed that 21.6% of the health workers were very worried about the household finances (Figure 4). The level of worried about household finance 66%.

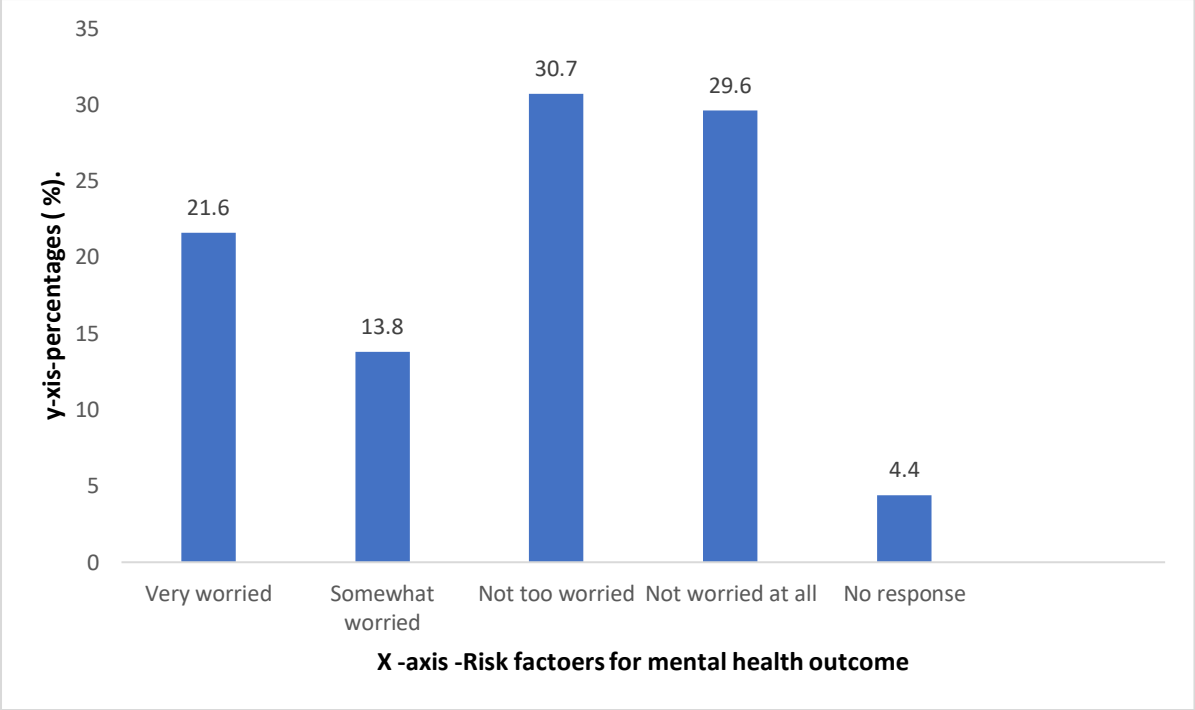

Figure 4. Distribution of How Worried Respondents Were about Household Finances

Discussion

This study examined the presence of depression, anxiety that nothing could calm them down, worried that they or someone in their immediate family may become seriously ill or Worried on having what to eat next week and how worried they were about their household finances in the next coming/subsequent week(s) among health workers in FCT, Abuja during the COVID- 19 pandemic. During the previous years, FCT faced few pandemics of HIV of 1981, Ebola virus in 2014-16, epidemics of Lassa fever, meningitis in 2017, yellow fever, and cholera.

cholera epidemic of 2021 in FCT, had morbidity of 698 infected case and the mortality was 60 [26] and measles without a significant impact on its healthcare system. The 2012 West Nile virus epidemics [27] and the 2013 MERS-COVID outbreaks [28] are two examples, but neither of them was like COVID-19 pandemic in terms of magnitude of the virulence and consequences, it caused on the country's aspects of healthcare, economy, the education and households [29]. A meta-analysis of the Tunisian study earlier research showed that on average, two out of every five HCPs endured negative psychological outcomes during the COVID-19 pandemic, for example, anxiety, depression, insomnia, and other worrisome outcomes [30]. In another meta- analysis which was undertaken on a global scale combined studies of influenza and coronavirus epidemics, showed a substantial proportion of psychological symptoms among HCPs [31]. Thus, HCPs have been challenged psychologically during the outbreak globally.

The current pandemic emerged in FCT, Abuja, and Nigeria as a country while facing Weak Health system, corrupt governance and economic crisis, political instability, high inflation rate, severe insecurity, kidnaping and banditry, all resulted to instability in the families. In Tunisia the pandemic emerged at a time when the Country was grappling with an economic crisis, in addition to the political instability [32]. In fact, Tunisia faced an unprecedented crisis due to continuous political turmoil and the unfolding economic and financial meltdown, which was exacerbated by the COVID-19 pandemic. FCT and with the whole of Nigerian HCP and the government as Tunisian HCPs and their government however, found themselves

unprepared psychologically and logistically to face pandemic [33]. More especially at its first onset just like the FCT HCP who even went on series of strike because of non- payment of salaries, salary irregularities and shortfalls since the migration of intergraded Personnel and payroll information System (IPPS), non-payment of covid-19 allowances, rural allowances and non- remittance of 3rd party deduction and non-payment of hazard allowances and inadequate supply of PPE and lack of moral support either from the government and from the community [34].

The FCT study showed that psychological depressive disorder was 77.4%, anxiety that nothing could calm them down was 31.9%, worried that they or someone in their immediate family may become seriously ill was 31.2% just as in the case of the study done in Bangladesh. [35, 36] Psychological stress faced by healthcare professionals during public health emergencies included constant worries about infecting children and parents of an individual, fear of death, anxiety about critical patients, and personal danger [37, 38].

From the previous study it was documented that healthcare professionals need social support from their family members, relatives, and neighbors. Being devoid of that, support can result in anxiety and depression for healthcare professionals It was predicted that steady payment of salary, allowances, and incentives such as economic support, constant supervision, sufficient protective equipment, adequate workforce, and community support could motivate health workers to contribute more during pandemic situations. But unfortunately, FCT and Nigerian healthcare professionals are mostly deprived of these incentives. Some of the infected healthcare professionals mentioned that though the government announced some financial incentives, they did not receive any. Worried on having what to eat next week was 54.3% while worried about their household finances in the next coming/subsequent week(s) was 66%. Also, in another study done in Nigeria showed health care providers were being stigmatised in a community for being working at the isolation centers and several report of eviction from their accommodations was obtained during the greatest hit of the outbreak [39,40,41]. Stigmatisation is observed in a study done in Singapore which revealed that fear, uncertainty, stigma with associated psychological distress was among some of the primary healthcare providers caused by SARS [42]. From this FCT, Abuja study majority of the respondents of 234 (63.8%) were female and overall participant's aged was18–64 years, just as Lai et al reported majority of respondents in that study was females and aged 26–40 years. With regards to the reasons for the mental health conditions, we found that majority of the medical professionals were worried about infecting their family reported by 53 (58.2%) followed by contracting COVID-19 themselves 20 (22.0%), which is consistent with the previously published literature [43]. A greater reason for worry about family is that often due to the extended family living as one unit in Pakistan, this finding is common among the non- medical professionals who were worried about contracting COVID-19 themselves 16(37.2%), followed by lack of appropriate training reported by 15 (34.9%) participants. Reasons for this persistent fear and reluctance despite adequate measures are the mass causalities worldwide being broadcast by the media. The mass fear of COVID-19 "corona phobia" [44] is also due to the unpredictable course of the disease, rate of virulence, no definitive treatment, intolerance of uncertainty, perceived risk of acquiring the infection can generate negative psychological responses including maladaptive behaviors, emotional distress, and avoidance reaction among common people. The psychological impact could have been reduced if we define achievable roster and adequate suitable medical equipment, Governments must deliberately find a way to reduce the percentage of the patients' attendants to the healthcare setups amid a crisis. Health

professionals should have their mental health screened regularly and monitored and supported to protect them from nervous breakdowns. At the same time, it is essential to identify secondary psychosocial risk factors (such as living with minors and elderly family members) and be supported. All these measures become inevitable in a developing country like Nigeria where mass awareness regarding mental health for such disorder is regarded as stigma and a taboo seeking medical help publicly.

This study has a few limitations, given that it was conducted during the period of series medical crisis of strikes due to non- payment of salaries, allowances, inadequate/no PPE and no support for health care providers from both the government and the community, which could possibly explain the high severity of mental health issues among healthcare workers working in FCT.

Ethics Statement

This study was approved by the FCTA Health Research Ethics Committee (FHREC /2021/01/100/24-08-21). Individual written/ informed consent was also obtained from the respondents before the questionnaire was to be answered. All information sought was handled with utmost confidentiality and in accordance with the Declaration of Helsinki.

Conclusion

The results of this study significantly highlighted psychological disorders such as depression, anxiety and stress among healthcare workers which is disturbing. Interventions are a must to salvage the psychological wellbeing of healthcare workers and reinforce the capacity of healthcare systems for future outbreaks. Health care workers with the whole population need capacity building and awareness of the outbreaks as well as measures such as telemedicine for monitoring and service delivery. Similarly, government and communal support are very important for increasing the competence of healthcare workers and will decrease the degree of mental disorders.

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Conflict of Interest

There is not any competing interests to disclose.

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The Use of the Mobile Phone for Real-Time Notifications of Public Health Threats in Three Mali Health Districts between 2020-2021

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Abstract

The Ministry in charge of Health in Mali has decided to involve the community in the fight against public health threats using mobile phones according to WHO guidelines. In this regard, a guide and standard tools for community-based electronic surveillance have been developed and tested in a pilot phase in the Kadiolo health district. After the training of the actors (community health workers "ASC", health workers and epidemiological surveillance officers), all were equipped with telephony and data collection tools. To this end, CHWs send a coded message to health centers and districts every day. Then these messages are confirmed or invalidated by health workers through an investigation and the taking of samples for transport to the lab. The number of cases notified by CHWs via the electronic system was 1397 cases in 444 days, with 170 cases of illnesses and 1227 cases of events. This electronic early warning system enabled the notification of cases in less than 24 hours at the higher level. Also, the completeness of sending messages by district varied between [71 and 83%] and the cumulative average completeness of the three districts was around 77%. On average 72% of CHWs sent at least one message with a notification of 3.14 cases of illnesses and events per day. Mobile telephone is a suitable and less expensive means for the notification of diseases and events in real time.

Keywords: *Community health workers, Events, Diseases, Real-time notification, Mobile telephony, Community-based electronic surveillance.*

Introduction

To this end, Information and Communication Technologies (ICT), mainly mobile telephony, widespread in the world and particularly in Africa during these two decades, would be an effective means for real-time monitoring of public health threats. In the countries of French-speaking Africa, it is well used and widespread in urban areas, but very limited in rural and semi-rural areas because of the unprofitable nature due to the low income of the populations, the low electricity coverage, and the low population density according to a study on the adoption of telephony in Saharan Africa [1].

At the end of 2020, 495 million people subscribed to mobile services in sub-Saharan Africa, representing 46% of the region's population. Among them, 303 million people across sub-Saharan Africa were connected to mobile Internet, the equivalent of 28% of the population and the penetration rate will reach 50% in 2025.

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Digital platforms in the financial services and healthcare sectors have seen strong investor confidence and consumer interest during the pandemic. This was mainly due to social distancing measures and initiatives to support public health efforts to combat the pandemic using digital technologies [2]. To do this, several applications such as Kobo Toolbox, Open Data Kit (ODK) have been improved and integrated into the countries' health system to facilitate the collection and transmission of data to the higher level.

In Mali, since the introduction in 2002 of mobile telephony, a real enthusiasm has developed at the level of the populations (all categories combined) for this portable communication instrument. Although the country has only three mobile network operators (the operator Télécel, Moov Africa Malitel and Orange), the telecommunications sector is dynamic and growing, the Global System for Mobile Communication Association (GSMA) estimates that the rate penetration of mobile telephony in terms of the number of unique subscribers would exceed just over 60%, while the penetration rate in terms of the number of Internet connections would rise to more than 95%. This difference is explained by the large number of customers with more than one mobile phone or SIM card [4.5]. The occurrence of emerging diseases such as: Ebola, avian flu, Rift Valley fever, COVID19 have put a strain on the health system [6, 7]; in this regard, to find an adequate system for strengthening disease reporting, mobile telephony has been using. Given the multiple epidemics the country has faced, a holistic approach including "One Health" has proven more promising. Mali, in collaboration with certain partners, has implemented community-based epidemiological surveillance (CBS) to strengthen the detection and real-time notification of diseases under surveillance. Learning lessons from pilot projects [7, 8], the Ministry in charge of health in collaboration with the other key ministries of the "One Health" platform (livestock, environment, and agriculture) with the technical and financial support of certain partners has drawn up a national implementation guide. implementation of CBS with a view to harmonizing interventions for greater effectiveness and efficiency [9]. One of the major innovations of this approach is the use of mobile telephony for real-time reporting of suspected cases.

This is an evaluative study which consisted of analyzing the methodology for implementing and transmitting data on notifiable diseases by Community Health Agents "CHW" in three districts of Mali (Kadiolo, Kati and Kangaba) via the mobile phone and to understand the contribution of this approach. In addition, this assessment should guide the integration of mobile telephony in strengthening surveillance of rapidly notifying diseases.

Methodology

The real-time notification system via mobile telephony in Mali has been implemented in three districts: namely Kadiolo in the Sikasso region, which was the pilot before moving on to the extension to the health districts of Kati and Kangaba in the Koulikoro region [6].

The actors at the level of the region (Epidemiological Surveillance Officer), districts (Epidemiological Surveillance Officer and Information System Officer), health center (Centre Technical Directors) and CHWs were trained on the configuration of very simple messages and short of public health diseases and events, with the aim of facilitating the dispatch of information in a rapid manner as soon as it is available in the community. Each of the participating entities (region, district, health center, CHW site) as well as the diseases and public health events under surveillance had a unique code which makes it possible to identify them once the message has been received by the different levels (Tables I and II). Consequently, each CHW site sends via its basic telephone a coded message of the 27 diseases and events under surveillance to its

supervisor, its district, and its region daily whether it has a case or not [8, 9].

In addition, each entity was trained in the use of disease codes, simplified case definitions and telephones. Also, the agents of the districts and the regional health directorates were trained on the processing of data via Excel which generates the names and the number of cases of diseases and notified events and on the use of the ACCESS software for the storage and the analysis of the data generating graphs and curves followed by parameters such as the completeness of the SMS sent, the number of suspected cases by disease, event, health center, CHW site, district and region. Once these data have been processed and stored on ACCESS by the epidemiological surveillance officers at district level (ESO), they are shared at the hierarchical level of the health pyramid for decision-making.

Table 1. Entity Coding Model

100	**01**	**01**	**01**	**01**	**Provenance illustration: 100 01010101**
CHW code	**REGION**	**DISTRICT**	**Health area**	**VILLAGE**	
	SIKASO	**KADIOLO**	**BANANSO**	**(CHW website)**	

Source: Community-Based Epidemiological Surveillance Training Module (CBS)

Code **100** corresponds to the category of the active surveillance system carried out by CHWs, code **01** which means the first region to have benefited from CBS, **01:** the first beneficiary district, **01**: the health areas have been numbered in alphabetical order, each CHW site or village in each health area has also been coded to facilitate their recognition and data processing.

Table 2. Model for Coding Diseases and Events under Surveillance

No.	**Coded**	**Case to be notified**	**Symptoms / Signs**
Diseases under surveillance (number)			
1	**A00**	Cholera	Diarrhea with a “rice water” appearance + vomiting
2	**C060**	Yellow fever	Fever + yellow eyes
3	**A99**	Hemorrhagic fever	Fever + Bleeding
4	**A39**	Meningitis	Fever + stiff neck (adult): Fever + convulsions + bulging fontanel (infants)
5	**B05**	Measles	Fever + pimples on the body + red eyes
6	**R05**	Tuberculosis in humans	Persistent cough for more than 2 weeks.
7	**A80**	AFP	Acute Flaccid Paralysis
8	**A33**	Neonatal tetanus	Stiffness + Refusal to suckle
9	**VOC**	COVID-19	Fever, cough difficulty breathing and sore throat
10	**A05**	TIAC	The presence of one of the following symptoms/signs: Nausea, diarrhoea, vomiting, abdominal pain following a meal or drink consumed by 2 or more people
11	**BRUC**	Brucellosis	Recurrent abortion, joint swelling
12	**ANT**	Coal / Anthrax	High fever, tremor, difficulty breathing, runny nose, and diarrhea with blood
13	**GAV**	Avian Flu	Eye tearing, redness and pain, burning or itchy eyes, photophobia, cough, sore throat

14	**RGA**	Rabies in animals	Biting, aggressiveness hyper salivation paralysis
15	**DRAC**	Dracunculiasis	Person presenting or having a history of a skin lesion with the appearance of a worm
16	**TBOV**	Bovine Tuberculosis	Any domestic or wild cattle in which one or more of the following signs are found: persistent cough, weight loss and loss of appetite in animals
17	**GIR**	Rift Valley Fever	Any animal with a high number of abortions, sudden deaths in young animals under 2 weeks old
	Events under Surveillance (number)		
18	**P95**	Early neonatal death	Death of a child born alive then died during the 1st week of life
19	**P96**	Late neonatal death	Late neonatal death: death occurring between the 8th day and the 28th day of life
20	**P97**	Stillborn	Delivery of a dead child
21	**D00**	Maternal death	Woman who died during pregnancy or within 42 days of childbirth
22	**BA01**	Animal bites / scratches	Any wound caused by the teeth, scratch of an animal; (dog, cat or donkey…)
23	**PV01**	Scorpion stings	Anyone bitten by a scorpion
24	**PV02**	envenomation	Anyone bitten by a snake
25	**APM**	Animal Dead Fish	Group animal deaths without apparent causes in animals (unexplained)
26	**ECD**	Community death	Deaths of people without apparent causes (unexplained)
27	**AEV**	Other Events Under surveillance	Rumors of public health, Natural disasters, drowning, fires, malodorous odors, Nuisances caused by chemicals, Invasions of locusts, caterpillars and seed-eating birds that invade plants or crops

Source: Community-Based Epidemiological Surveillance Guide (CBS)

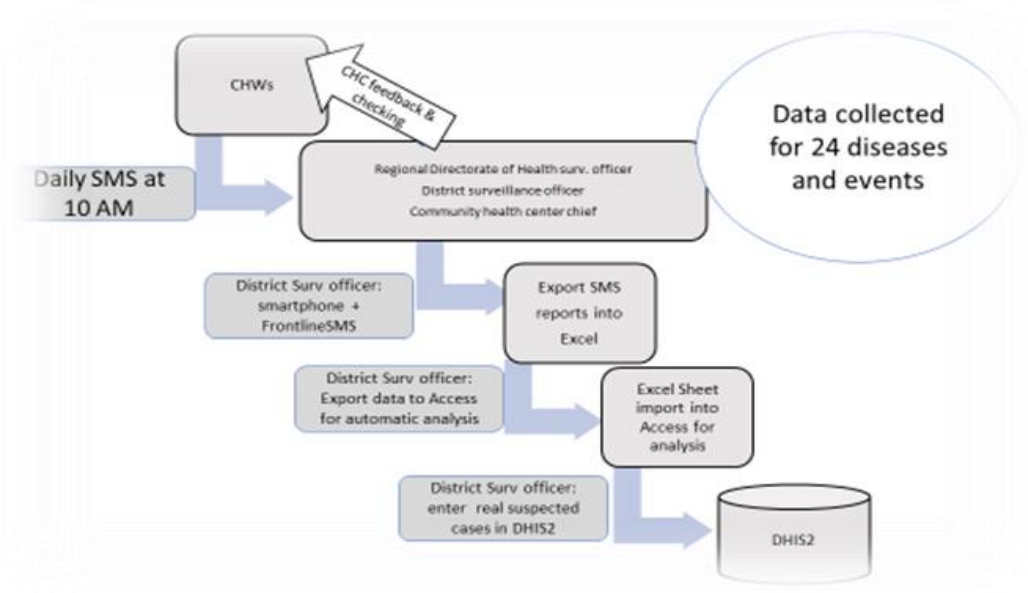
Table 3. Illustration of Coded Message Sent by the Community Health Worker

FIXED (not editable)	**VARIABLES (the numbers in red in front of the disease & event codes can be modified)**
100 01030101: example of deciphering the sending code: 100_CHW code / 01_Sikasso region / 03_Kolondièba district / 01_Bougoula health area / 01_ Zoha village	100 01030101 0A00 1C060 2A99 0A39 0B05 4R05 0A80 0A33 9COV 0A05 0BRUC 0ANT 0GAV 0RGA 0DRAC 0TBOV 0RIF 0P95 0P96 0P97 0D00 0BA01 0PV01 0 PV02 10APM 4DCE 2AEV

Source: Community-Based Epidemiological Surveillance Training Module (CBS)

The numbers 0, 1, 2, 3, define the number of suspected cases by disease and event, in case of absence of cases the number zero (0) is put to indicate that there are no cases in this village or this CHW site.

The spaces between each word and the difference between zero ' **'0'** ' and the letter '**o** " are very important (non-compliance could create problems with the processing software).



Source: Community-Based Epidemiological Surveillance Guide (CBS)

Figure 1. Message Transmission Circuit Codified

In the community, the ASC carries out the daily active search for cases, the agent sends a simultaneous coded message to all the entities no later than 10 a.m., but in the event of detection of other threats, he is required to send another message; once sent, the focal point of the health center to which he reports is responsible for verifying the information and classifying (suspect or not) then, depending on the status of the case, taking the appropriate measures including the investigation and each day the focal points of the districts are responsible for analyzing and drawing the attention of those responsible for the actions to be taken.

Results

Data was collected in the districts of Kadiolo from October 2020 to December 2021, Kati from Jan 2021 to December 2021, Kangaba from July 2021 to December 2021. In this respect, the number of agents trained: 166 CHW, 58 Health workers, 05 monitoring officers and 04 information system officer. During these different periods mentioned, the cumulative number of cases notified by the CHWs in the five districts is 1,397 cases of illnesses and events, all the cases recorded are distributed as follows: Kadiolo 744 cumulative cases including 44 cases of illnesses 700 cases of events, Kati 402 alert cases including 66 cases of illness 336 cases of events, Kangaba 251 alert cases including 60 cases of illness 191 cases of events. For the cumulative completeness of the daily sending of SMS by CHWs according to the periods mentioned above, we note a rate of 83% in Kadiolo), 71% in Kati and 76% in Kangaba.

Analysis of Collected Data

Among the **170** cases of disease notified, measles dominates with **100** cases or 58.82%, followed by tuberculosis **22** cases or 12.94%, yellow fever **17** cases or 10%, anthrax **14** cases or 8.23 % and PFA **09** cases or 5.29%. Then, of the **1227** cases of notified events, animal bites and stings dominate with **377** cases or 30.72%, followed by envenomations **339** cases or 27.62%, then neonatal deaths **320** cases or 26.07%, community deaths **126** cases or 10.26%. Kadiolo district records the highest proportion of cases (53%) followed by Kati (29%) and Kangaba. (18%).

We note that only the district of Kangaba has ≥70%. a slightly more stable data completeness rate of

Table 4. Disease Alert Cases and Events Notified in Kadiolo, Kangaba and Kati from the 4th Quarter of 2020 to the 4th Quarter of 2021

Diseases and Events		**Case notification districts**		
		Kadiolo	*Kangaba*	*Katy*
Diseases	*Cholera*	0	1	0
	Yellow fever	14	1	2
	VHF	0	0	1
	Meningitis	1	0	0
	Measles	22	55	23
	TB	3	0	19
	AFP	2	0	7
	COVID-19	1	0	0
	Anthrax Coal	0	0	14
	Avian Flu	0	1	0
	Rabies in animals	1	2	0
Events	*TIAC*	4	0	9
	Neonatal death	219	30	71
	Maternal death	1	7	10
	animal sting bite	267	31	79
	envenomation	145	28	166
	dead fish animals	1	6	1
	Community death	61	65	0
	AEV	2	24	0
Total		**744**	**251**	**402**

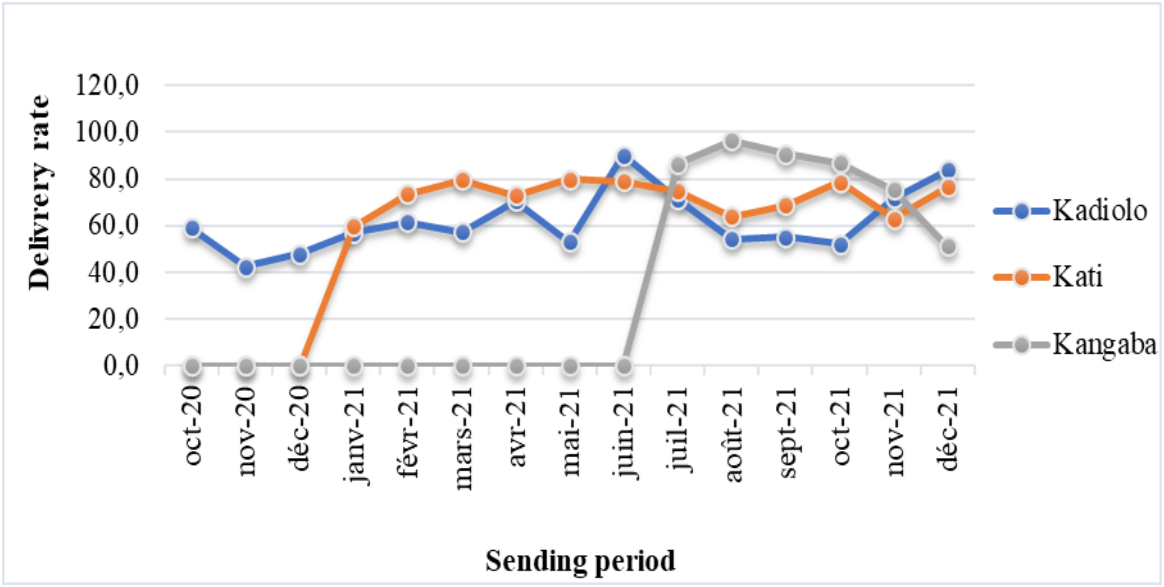


Figure 2. Evolution of the Transmission of Messages from the 4th Quarter of 2020 to the 4th Quarter of 2021 by District

Discussions and Comments

During the data collection period, the electronic community surveillance system made it possible to notify **1,397** cases, i.e., 170 cases of illness and 1,227 events in the three health districts. As for the completeness of sending messages via mobile telephony, the district of Kadiolo has the highest proportion (83%) followed by Kangaba **(76%)**; Kati **(71%)**. The electronic system made it possible to notify the above-mentioned cases in less than 24 hours to a higher level. Also, the cumulative completeness of messages sent by District varied between **[71 and 83%]** and the average cumulative completeness of the three districts was around **77%**. This implies that on average **72%** of CHWs sent at least one message during the period and with an average notification of **3.14** cases per day via the electronic approach.

The implementation of this system made it possible to revive the detection and notification of cases of diseases and events under surveillance, including by the actors who already exercised this function [8-10]. Indeed, in Kadiolo since 2018 no case of yellow fever has been notified, after the implementation of the electronic approach, an epidemic of yellow fever was notified in addition to measles and a case of AFP [11-13]. Concerning the health district of Kati two **(02)** epidemics of measles, nine (**09)** cases of food poisoning which were the subject of the investigation which made it possible to detect nearly **155** cases of collective food poisoning and seven **(07)** AFP cases have been notified. For that of Kangaba, two **(02)** epidemics of measles were notified.

In Côte d'Ivoire, similar results were reported in 2019 during the pilot phase of community surveillance in the Kabadougou region, Bafing Folon. It enabled the electronic monitoring system to detect and notify **2459** cases of illnesses and events, of which **2,062** (48%) concerned community deaths, **1,773** (42%) sick or dead animals and fish and **430** (10%) the number of other events [14].

A study in the Netherlands on the introduction of the rapid and comprehensive electronic infectious disease reporting system in 2003 compared the reporting times made in 2001 by the conventional system with those reported by the OSIRIS system in 2003. Two types of delays were compared: the total delay, defined as the time elapsed between the onset of symptoms and the declaration at the national level; and the central delay, defined as the time elapsed between the regional and national declaration. The results of the study highlighted the ability of the system to contribute to the reduction of the minimum reporting period from 10 days to 1 day. This study confirms the benefits of electronic reporting of infectious disease surveillance data in terms of timeliness and completeness. It has also documented the improvement in the timeliness and completeness of national infectious disease surveillance data that has occurred using electronic communication. Also, a study conducted in Burkina reported the benefits of the electronic approach [16].

As in our study, improved case and health event reporting was also observed during the Ebola epidemic in Guinea, which prompted WHO to integrate the community in the fight against epidemics in the country. purpose of controlling the spread of the virus. This approach has not only resulted in increased reporting, but also close monitoring, rapid case management of Ebola outbreaks and the COVID19 pandemic [17, 18]. To this end, Mali as part of the implementation of WHO guidelines has revised the third edition of its guide to integrated disease surveillance and response in accordance with WHO Afro prescriptions [19, 20]. Also in Côte d'Ivoire, according to the Saya N'Guessan study, epidemics of measles, yellow fever, avian flu and peste des petits ruminants have been reported [11]. In Senegal, Mali and Guinea, this integrated approach has further strengthened the detection and rapid containment of an epidemic of Yellow Fever and as well as a suspected case

of AFP and measles notified, also enabled the rapid and easy establishment of the "one health" approach [8-10]. Genuine pandemic preparedness and response requires replacing bi/multilateral aid and private philanthropic investments that hinder the institutionalization and professionalization of CHWs with investments made in partnership with a recipient country. These funds should be deployed quickly and flexibly according to the priorities set by the government [2 1].

Conclusion

The use of mobile telephony is an effective means for real-time notification of public health threats in its pilot phase in Mali; its extension to the community level will allow the rapid declaration of any public health threat whether human, animal, or environmental and in a global way a modeling of the "One Health" approach. It is also a less expensive way to monitor public health threats in real time. This digitization of surveillance can be extended to other areas of public health such as malaria surveillance, vaccination, maternal and child health and nutrition in all districts of Mali. Finally, other countries could also adopt it to strengthen their early warning system.

Conflict of Interest

All authors and co-authors declare that they have no conflict of interest for the work submitted.

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Global Strategic Human Resource Management Practices and Systems Considerations for Virtual, Remote-Working Employees in COVID-19 Pandemic Era: A Triangulation of Meta-Methods

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Abstract

Virtual organisations have progressively pervaded the world where groups of workers implement boundaryless, concurrent, and cooperative job processes outside physical job environments. This is made possible by internet accessibility; and information, communication, and technology (ICT) which organises and integrates employees' abilities and assets for the sole purpose of achieving the overall organisational goal. Virtual jobs offer fresh management problems in comparison to conventional in-person job habits. Human resource specialists reveal that various managers suffered from deficient capabilities and power during COVID-19 lockdown in comparison to conventional working environment management. A meta-evaluative research was conducted in order to conceptualize an evidence-based synopsis on virtual administration of remote-working employees and propose an applicable conceptual framework. The research utilised sixteen peer-reviewed published articles on management of virtual remote-working employees between 2020 and 2023. The results were able to systematically demonstrate remote working procedures of diverse organizations facilitated by virtual processes and technologies, and strategic human resources management model as well as collaborative methodologies that empowered the peculiar COVID-19 virtual workspaces. Communication, information technology and managerial proficiencies are paramount for managers of employees in such settings. Consequently, a conceptual framework for management of remote-working employees have been designed containing managerial expertise, trainings, ICT and environmental components. Managers are required to have the necessary abilities required to anticipate diverse circumstances and to prepare beforehand activities that counter likely contradictions and disputes. Virtual remote-working groups deliver great prospects; thus, managers should aim to capitalise on its benefits while seeking to minimise its drawbacks.

Keywords: *Remote-Working, Strategic Human Resource Management, Virtual.*

Introduction

Virtual organisations whose mainstay is information, communication, and technology (ICT) system arose in the nineties to meet contemporary marketplace ever-changing demands for global collaborations and flexibility [1]. A virtual organisation is one where all boundaries are eliminated and comprises of people working outside physical job environments without being tied to a specific office. This is made possible by internet accessibility and information, communication, and technology (ICT) which organises and integrates employees' abilities and assets for the sole purpose of achieving the overall

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organisational goal. Virtual organisations have progressively pervaded the world, with group of workers who implement concurrent and cooperative job processes communicating through information technologies. Thus, virtual groups possess two scopes: that of working together within physically isolated workspaces and interacting with each other using electronic transmission routes [2, 3]. Remote working (also known as telecommuting, distributed work, or flexible work arrangements) is simply defined as a group of virtually located employees with one manager working at different job sites. It is an adaptable job plan where employees work from diverse settings distant from their conventional workplace and are not physically connected with colleagues but capable of communicating with them via technological means [2, 4, 5].

The outburst of COVID-19 pandemic resulted in remote-working to prevent the virus from spreading, which has become a new style of work for numerous employees globally even after the major crisis. Studies have found that about 50 percent of organisations in the European Union became involved in virtual working in comparison to 12 percent before COVID-19 [6, 7.]. Research by [8] on how working from home as a result of COVID-19 affected workers' efficiency, job commitment and worrisome feelings during the pandemic concluded that personal and job-linked elements equally impede and expedite remote-working throughout the COVID-19 period while self-guidance and independence were definitely connected to efficient and committed remote-working. Additionally, this study revealed deficiency in the capability of managers and human resource personnel to strategically manage human resource virtual teams whom conflicting household-job engagement, societal seclusion likewise disrupting job setting were plausible impediments.

Strategic Human Resource Management

Strategic human resource management (SHRM), which indicates an interface between HRM and strategic management, is the process of comprehending an organisation's strategic positioning, creating, or re-creating organisational strategies, deciding on potential strategic alternatives, and changing strategies to actions. The goal of SHRM is noted as prompting current strategies for the times ahead, likewise, becoming operational means of incorporating and establishing change systems processes. Strategic HRM is primarily aimed at generating organisational capacity through guaranteeing that competent, involved, dedicated and highly ambitious staffs are available for sustaining competitive advantage [9, 10] and its objectives are to: enable an organisation to be purposeful; providing long-term management; and instituting clear-cut objectives for attainment.

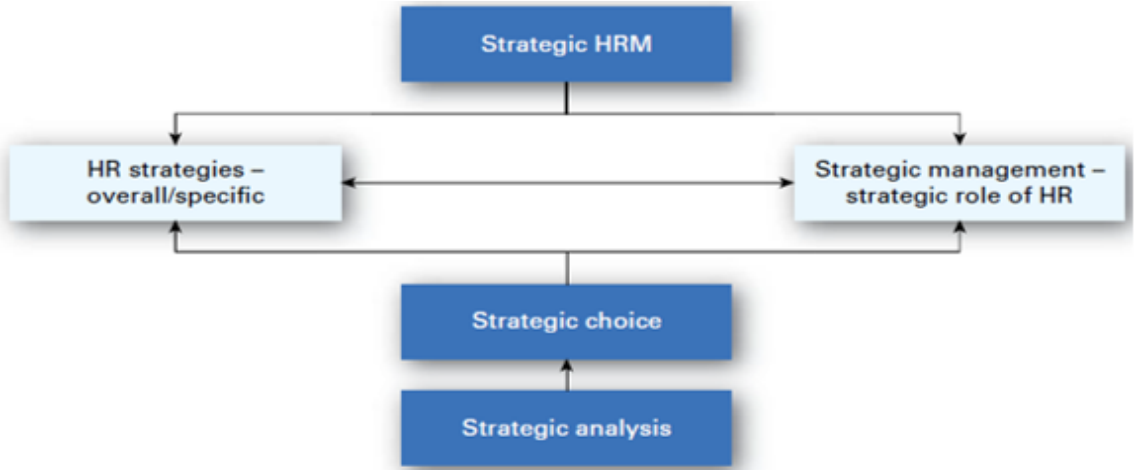


Figure 1. Strategic HRM Model. Source: [10]

SHRM entails employing existing and preferred strategies likewise founding tactical primacies and is basically related to integrating business as well as human resource arrangements which would contribute to accomplishing organisational goals. As indicated in Figure 1, SHRM is mainly focused on incorporating HR functions and policies alongside organisational roles and proposals and does not simply concerns designing projects and creating personal human resource approaches. In a nutshell, SHRM relates to human resource tactics as well as strategically managing HR specialists' actions [10].

This article systematically reviewed publications focusing on management of remote working processes and practices. However, virtual work settings have been depicted as a location that impede trust creation, with challenging authority expression and confusing correspondence as well as requiring self-governance [11]. Thus, virtual groups possess distinctive elements in comparison to conventional workgroups which managers must recognise and accommodate. Consequently, discovering and comprehending the particular social factors and computer-mediated technicalities surrounding management of virtual staffs will increase organisational efficacy as well as help establish an efficient human resource management (HRM) system for enhanced accomplishments [12, 13].

Methodology

This research is both qualitative and quantitative in nature, consisting of a blend of exploratory and descriptive procedures designed to produce conclusive results from data collected and analysed. The research process began with reviewing of relevant literatures to determine vital elements of remote working and SHRM. Thereafter, utilizing keywords likewise systematic review of peer-reviewed research articles of studies conducted between 2020 and 2023 found in Google Scholar, EBSCO Host, Scopus, Emerald and Pro-Quest search engines, relevant articles published in online journals such as Research Gate, Academia.edu, Elsevier and Springer were collected. Assessment of the articles were done severally via utilizing the critical appraisal skills program (CASP) method which is established upon abstracts, contents, characteristics, scope and findings [14]. The selected publications were methodically scrutinized, fundamental notions that apply to our research question were encoded after which summarization and extraction of the codes was done and the data was analyzed and synthesized.

Research Method

A pioneering mixed method was used for conducting this research., consisting of blending both meta-synthesis and meta-analysis research. Meta-synthesis involves comprehending and recounting matters, fundamental features plus recurrent themes in qualitative research. It blends and incorporates investigations about a particular subject for deriving inclusive, explanatory conclusions and broadens as well as augment findings through appraising an investigation's distinctiveness inside an all-inclusive, informative totality [15, 16]. Meta-synthesis is considered a valuable qualitative analytical technique as it permits combining diverse literatures aimed at additionally contributing to past knowledge that were accomplished within original theoretic and experimental research as well as facilitates development of conceptual frameworks. It aids organizing results via utilizing theoretic viewpoints and identification of groupings as well as strategies, yet preserving original evidence [17, 16]. On the other hand, Meta-analysis refers to scientifically synthesizing quantitative research outcomes. Its goal is summarizing of quantitative statistical outcomes contained within groups of research in order to generalize about a subject matter and arrive at conclusions. It enables comprehension about typical consequences likewise inconsistencies across many investigations, resulting in further

knowledgeable choices regarding vital public matters [18].

Sampling Procedure

A sample is made up of a sub-group, representative of the general populace of consideration. Research is most often done using both convenience and purposive sampling. Convenience sampling denote collecting data of qualified essence from a readily obtainable origin, whereas purposive sampling entails using subjects having fixed features pertinent to research and who meet all specified inclusion and exclusion criteria [19]. The non-Probability sampling method, which is sample selection founded upon subjective judgement [20] comprising of Convenience and Purposive sampling was conducted for this research after creating a sampling frame listing the seven continents in the world. Due to sparse search results that combined the 3 research focus, studies that contained any country out of any of the continents which comes up as either qualitative or quantitative primary research were used. Most search results were either editorials/commentaries or reviews, thus the reason for the type of sampling methods utilized for this study.

Inclusion and Exclusion Criteria

Creating inclusion and exclusion criteria when conducting research is the norm in design of superior research technique. Inclusion criteria denote important attributes about a study group that a researcher employs in answering research questions; whereas exclusion criteria refer to traits in a prospective research group that might affect achievements of a research or elevate the likelihood of getting wrong results. Accurately defining these two criteria is crucial for research design as well as for evaluating ways by which these criteria decisions influence the validity of external outcomes [21]. Other vital generalized inclusion criteria applied include peer-reviewed journals, research conducted within the last 5 years, superior-quality articles relating to staff development, managerial competency trainings, COVID-19 management of remote-working staffs, and employee experiences about working remotely. Employing these criteria ensured that the meta-synthesis process was strictly narrowed and concentrated. In order to get proper representation of publications to be analyzed, the subsequent inclusion criteria was applied: Studies' uniformity with our research question and focus, HRM quantitative or qualitative primary data gathered from surveys, focus group discussions and in-depth interviews, concise records of research context; explicit explanation about sampling methods, data gathering process and analytical procedures as well as evidences showing how working from home due to COVID-19 affected workers' efficiency and job commitment. Thus, we used just researches that concentrated on SHRM processes related to management of remote-working employees, particularly during the COVID-19 pandemic. This study chose 2020 as initiating year as publications on remote-working heightened in recent times.

Search Engine Explorations

This concerns the identification of research that could be pertinent to meta-synthesis via technical search engines. From the first stage, four vital keywords for the research articles search were identified. These are: Virtual, Strategic Human Resource Management, Remote-working and COVID-19. We utilized the following search engines: Google Scholar, EBSCO Host, Scopus, Emerald and Pro-Quest to gain access to their databases. The preliminary keywords searched were: "Strategic Human Resource Management "AND "COVID-19 Pandemic" OR "COVID-19 Pandemic" AND "Remote Working". The search also included other supplementary keywords such as: e-HRM, qualitative research, quantitative studies, information, communication, and technology (ICT), virtual groups, management, and HRM models. Lastly, our search looked out for published and unpublished works to ensure a fair

balance of wide-ranging literatures. A large volume of publications was chosen for initial review in order to restrict chances of biases [15, 22].

Extraction and Coding of Data

Stage four of the methodology is that of extracting, coding likewise classification of findings from chosen publications. A vital step in contextualizing meta-synthesis and meta-analysis studies is that of deciding validity and reliability of coding structures [16]. Since our research goal was development of a conceptual framework, the contents of selected articles were coded and analyzed based on information regarding challenges associated with remote working and SHRM approaches to management of remote-working employees. An open coding system was utilized for classification of evidence gathered from primary research, particularly from the findings and discussion segments [15, 17], taking into cognisance diverse localities of the studies while developing the open coded listing.

Furthermore, two researchers autonomously and meticulously studied all the articles and documented their findings. Thereafter, these autonomous researchers adhering to determined standards, derived codes for the rest of the publications. Every discrepancy while coding and studying the articles were judiciously noted and fixed after scrutinizing of the article and dialogue amongst the coders. Using two coders lessened data documentation errors as well as eliminated overlooking of pertinent concepts.

Cross-Article Level Analysis

Assemblage of findings into theoretical groupings resulted in emergence of consistent thematic patterns existing within the gathered data. This procedure boosted the data theoretically and shifted it from article-specific level to a Cross-article level analysis. The casual network scheme was utilized for evaluating the actions, occurrences and aspects that enable or hamper successful management of remote working. This scheme resulted in producing a matrix with a row for each of publications having a corresponding column consisting of summaries of variables groupings emanating from the initial coding step. The matrix supplied a snapshot of variables compendium from which fundamental themes and patterns emerged [15].

Results

Findings from this research are presented in this section. Table 1 represent coded identified remote working factors consisting of enabling and limiting variables; Table 2 represents a row-by-column matrix of meta-evaluative literatures and associated findings codes while Figure 3 is a summary of themes and patterns associated with the identified variables.

Data Collection Procedure



Source: Authors-designed from [15, 16, 17]

Figure 2. Meta-evaluative Data Collection Flowchart

Table 1. Identified Remote Work Enablers and Limiting Factors in Virtual Workspace Management

S/N	Virtual Groups Enabling Variables/Factors	Code	S/N	Challenges/Limiting Factors	Code
1.	Information, Communication and Technology (ICT) System/Tools	**A1**	**1.**	Physical Distance between Managers and Remote Woking Subordinates	**Z1**
2.	Physically Isolated Workspaces That Lessen Workplace Conflicts/ Social Isolation	**A2**	**2.**	Lack of Digital Communication Modes & Work Aptitudes/Virtual Leadership Deficiency	**Z2**
3.	Consistent, Timely and Transparent Communication/Collaborations.	**A3**	**3.**	Not Meeting Timelines to Deliver Results Promptly/ Non-Prioritisation of Time Usage	**Z3**
4.	Availability of Home-based Virtual Work Infrastructures (electricity, internet)/ Trainings	**A4**	**4.**	Lack Of Informal Setting for Exchanging Information and Inspiring, Useful Ideas	**Z4**
5.	Happy/Satisfied with Remote working (Telecommuting, Hybrid, Staggered Work shifts, Flexible work arrangements, totally remote working)/Convenient/Timesaving/Cost-saving	**A5**	**5.**	Staffs' Tendency to Fade Away or Disappear into Virtual Groups.	**Z5**
6.	Strategic Human Resource Management Components (HR Strategy Policies, Plan & Compensation, Change Management, Efficient Administration, Staff Engagement [Ulrich Model]).	**A6**	**6.**	Lack of Physical Collaboration with Colleagues/Socially disconnected	**Z6**
7.	Managerial Competencies & Decision-making Quickness	**A7**	**7.**	Employees' Autonomous/Self-governance Incapabilities	**Z7**
8.	Communicating Closely with Bosses	**A8**	**8.**	Micromanagement Issues/Elevated Managers' Monitoring	**Z8**
9.	Job Commitment/Responsibility and Motivation	**A9**	**9.**	Communication Difficulties (Asynchronous, Complicated & Laborious; Deficient Non-Verbal Communication)	**Z9**
10.	Flexibility/Adaptability Freedom (Process, Work and Skill)	**A10**	**10.**	Problems With Disseminating Implicit Information/Innovative Ideas	**Z10**
11.	Staff Training and Development & Wellbeing Remote Sessions	**A11**	**11.**	Loss Of Trust in Management Overseeing and Assessments	**Z11**
12.	Psycho-social Support and Empathy from Organization/ Counselling Services	**A12**	**12.**	Information/Work Overload	**Z12**
13.	Autonomy of Remote Workers to Take Initiatives/Self-perceived Coping Capabilities	**A13**	**13.**	Social Distancing & Occupational Hazards/Health and Safety Concerns	**Z13**

14.	Opportunities For Socialising Virtually	**A14**	**14.**	Pressure for Organizational (Workspace)/Infrastructural (electricity)/Technological (internet/ ICT) Support at Home	**Z14**
15.	Decentralizing & Delegating of Control and Authority to Line Managers	**A15**	**15.**	Isolation/Loneliness	**Z15**
16.	Having a Sense of Communal Unity/Teamwork	**A16**	**16.**	Difficult Family Dynamics/ Conflicting Home Tasks	**Z16**
17.	Elevated Tolerance of Errors Between Line Managers and Subordinates and Vice-versa	**A17**	**17.**	Poor Housing Condition/Home Unsuitable for Work	**Z17**
18.	Extended Sleeping Time/Getting Sufficient Sleep	**A18**	**18.**	Loss of Managerial Lateral Co-ordination	**Z18**
19.	Shorter Working Hours (40 Hours or Less)	**A19**	**19.**	Invisibility of HR Resources for Line Managers	**Z19**
20.	Weekly /Regular Virtual Staff Meetings/Teleconferencing/Briefings (Use of Zoom, Skype)	**A20**	**20.**	Stalled Performance Development Procedures/ Scarce Feedback/Inability to Assess/Monitor Progress	**Z20**
21.	Time Management Skill/Achievements of Objectives	**A21**	**21.**	Not Enough Crisis Management Information & Expertise	**Z21**
22.	Healthy Work-Life-Balance/Leisure	**A22**	**22.**	Lengthier Work Hours	**Z22**
23.	Non-occupational Activities/Household Obligations	**A23**	**23.**	Imbalance in Staffs' Occupational and Private Lives / Inter-role struggle	**Z23**
24.	Health & Wellbeing/ Safety Procedures & Equipment Availability (Masks, Sanitizers, etc) /Provision of Activity Tracker to Staffs	**A24**	**24.**	Inadequate Sleeping Hours	**Z24**
25.	Access to Government Funds/Additional Monetary Compensations /Prompt Salary Payment/Job Security	**A25**	**25.**	Difficulty Accessing Work-Related Information and Resources	**Z25**
26.	Continuous, Updated Information about the Pandemic from Employer/ HR Help desk	**A26**	**26.**	Mental Ailments/Mental Weariness Emotional Fatigue/Stress/ Burnout/Panic/ Loss of Focus	**Z26**
27.	Supportive Environment for Employees' Voicing their Apprehensions & Give Feedbacks	**A27**	**27.**	Cost Reducing (Forced Leave/Retrenchment Tactics/Salary Reduction) /Workforce Deficiency	**Z27**
			28.	Physical Overtiredness	**Z28**
			29.	Enforced e-Presence	**Z29**
			30.	Formulating Fresh Organizational Protocols and Measures/ Government Regulations	**Z30**

Source: Authors-designed from [2, 5, 6, 7, 8, 12, 40]

Table 2. Triangulated Meta-Methods Investigation of Virtual Remote Working Variables and Patterns

S/N	Study	Journal Title	Country	Sample Population	Enabling Variables Codes	Limiting Variables Codes
1.	Tanpipat et al, (2021)	[23] Implementing Remote Working Policy in Corporate Offices in Thailand: Strategic Facility Management Perspective. [QUANTITATIVE].	Thailand	Companies (Property & Facility Management, Finance, Architecture, Education. Agriculture, Industrial, Technology).	**A1, A2, A3, A6, A8, A9**	**Not Reported**
2.	Daniels et al, (2022)	[24] One Size Does NOT Fit All: Understanding Differences in Perceived Organizational Support During the COVID-19 Pandemic. [QUANTITATIVE].	United States	Service Industry	**A3, A6, A7, A12, A13, A24, A25, A26, A27**	**Z13, Z14, Z16**
3..	Pasquel Cajas et al, (2023)	[25] Remote Work in Peru During the COVID-19. [QUANTITATIVE].	Peru	Corporations	**A3, A5, A9, A10, A12, A13, A16, A21, A22, A25**	**Z2, Z3, Z6, Z12, Z13, Z14, Z26, Z29**
4.	Amano et al, (2021)	[26] Factors Associated with The Work Engagement of Employees Working from Home During The COVID-19 Pandemic in Japan. [QUANTITATIVE]	Japan	Nation-wide, Cross-sectional	**A3, A8, A12, A16, A17, A18, A19, A20**	**Z3, Z16, Z21, Z23, Z24. Z26**
5.	Toscano & Salvatore (2020)	[27] Social Isolation and Stress as Predictors of Productivity Perceptions and Remote Work Satisfaction During The COVID-19 Pandemic: The Role of Concern About the Virus in A Moderated Double Mediation. [QUANTITATIVE].	Italy	Nation-wide, Cross-sectional	**A3, A5, A13, A14**	**Z6, Z7, Z13, Z15,**
6.	Raišienė et al, (2020)	[28] Working from Home – Who is Happy? A Survey of Lithuania's Employees During the COVID-19 Quarantine Period. The Virus in A Moderated Double Mediation. [QUANTITATIVE].	Lithuania	Cross-sectional	**A3, A9, A11, A13, A21**	**Z1, Z4, Z6, Z7, Z9, Z10, Z11, Z12, Z16, Z20, Z25**

7.	Chu et al, (2022)	[29] Learning from Work-From-Home Issues During The COVID-19 Pandemic: Balance Speaks Louder Than Words. [QUANTITATIVE].	China	Manufacturing, Trades, Hospitality, Real ESTATE, Construction, Education, Health, Finance, Insurance, Transportation.	**A1, A2, A4, A5, A10, A19, A22, A23, A25**	**Z17, Z23, Z26**
8.	Matli (2020)	[30] The Changing Work Landscape as a Result of the COVID-19 Pandemic: Insights from Remote Workers Life Situations in South Africa. [QUANTITATIVE].	South Africa	Cross-sectional	**A1, A5, Z10, A22, A23, A24**	**Z1, Z3, Z6, Z12, Z14, Z16, Z17, Z22, Z23, Z26**
9.	Elsafty & Ragheb (2020)	[31] The Role of Human Resource Management Towards Employees Retention During COVID-19 Pandemic in Medical Supplies Sector – Egypt. [QUANTITATIVE].	Egypt	Medical Supplies	**A3, A6. A12, A22, A24, A25, A26**	**Not Reported**
10.	Akinnubi (2021)	[32] Assessment of Human Resource Management During COVID-19 Pandemic in Private Universities in Kwara State, Nigeria. [QUANTITATIVE].	Nigeria	Tertiary Education	**A1, A3, A11, A5, A20. A24, A25**	**Z27**
3.	Minbaeva & Navrbierg (2023)	[33] Strategic Human Resource Management in The Context of Environmental Crises: A COVID-19 Test. [QUALITATIVE].	Denmark	Public Sector & Private Businesses. (Agriculture, Finance, Industrial, Transport, Construction, ICT, Insurance, Real Estate, Education, Leisure).	**A1, A3, A4, A6, A7, A9, A10, A11, A12, A13, A14, A15, A16**	**Z1, Z2, Z4, Z8, Z9, Z12, Z15, Z16, Z17, Z18, Z19, Z20,**
12.	Adisa et al, (2022)	[34] Exploring the Impact of COVID-19 on Employees' Boundary Management and Work-Life-Balance. [QUALITATIVE].	United Kingdom	Higher Education (HE) Scholars	**A1, A4, A22, A23**	**Z2, Z5, Z6, Z8, Z12, Z14, Z16, Z22, Z23, Z26, Z28, Z29**
13.	Agarwal (2021)	[35] Shattered but Smiling: Human Resource Management and The Wellbeing of Hotel Employees During COVID-19. [QUALITATIVE].	India	Hospitality (Hotel)	**A1, A3, A6, A7, A10, A11, A12,**	**Z11, Z12, Z13, Z14, Z15, Z16, Z17**

14.	Messabia et al, (2022).	[36] Managing Restaurants During The COVID-19 Crisis: Innovating to Survive and Prosper. [QUALITATIVE].	Canada	Hospitality SMEs	**A1, A4, A6, A7, A10, A16, A22, A25**	**Z3, Z12, Z13, Z21, Z26, Z27, Z30**
15.	Branicki et al, (2022).	[37] Surviving COVID-19: The Role of Human Resource Managers in Shaping Organizational Responses to Societal Paradox. [QUALITATIVE].	Australia	Private, Public and Not-for-profit Sectors	**A2, A3, A5, A6, A7, A10, A12, A13, A17, A24**	**Z1, Z5, Z6, Z8, Z9, Z10, Z11, Z13, Z14, Z15, Z16, Z18, Z20, Z22, Z23, Z25, Z26, Z27**
16.	Nutsubidze & Schmidt (2021)	[38] Rethinking the Role of HRM During COVID-19 Pandemic Era: Case of Kuwait. Review of Socio-Economic Perspective. [QUALITATIVE].	Kuwait	Government and Private Organizations (HR Professionals)	**A3, A4, A6, A9, A11, A12, A20, A24, A26, A27**	**Z2, Z3, Z9, Z10, Z20, Z21, Z26, Z27, Z30**

Source: Authors-designed [from Meta-evaluative Researched Articles].



Source: Authors-designed [from Research Results]

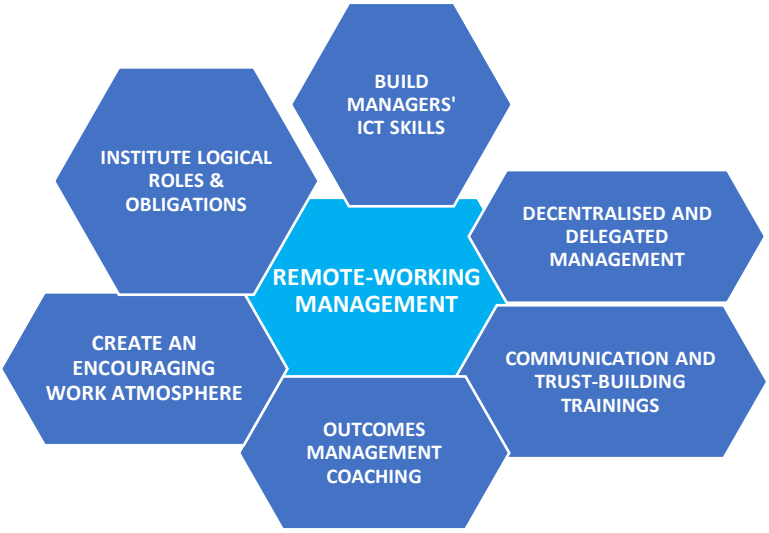
Figure 3. Thematic Patterns from Finding

Results and Discussion

Six qualitative primary research (In-depth Interviews and Focus Group Discussions) were triangulated with ten quantitative primary research (surveys using questionnaire) in our meta-evaluative study. Results showed that numerous limiting factors of remote working during COVID-19 abounded, outweighing the enablers in 4 of the studied countries. Most important amongst those challenges were employees' lack of ICT skills, achieving a healthy work-life balance as well as inadequate remote workers' management competencies amongst HR managers mainly due to abruptness of the situation and lack of crisis management abilities. There was moderate level of SHRM implemented during the lockdown with 50% of journals researched mentioning that as a strategy employed. Studies conducted by researchers have confirmed that administrators are battling with efficient managing of employees who work remotely, resulting in numerous staffs experiencing distrust and micromanagement, and the demand for urgently developing the competencies of managers concerning managing employees during such critical period [39, 40]. Thus, managing remote-working virtual workers effectively constitute a major opportunity which could provide a competitive advantage for sustaining and improving organizational accomplishments.

Proposed Conceptual Framework

Based on the literature reviewed and research results, the conceptual framework below is being proposed to improve the systems for managing remote-working virtual employees and enhancing the prospective gains of a well-designed virtual workspace:



Source: Authors-designed [9, 10]

Figure 4. Remote-working Management Conceptual Framework for Managers

Conclusion

Current outworking studies have produced evidence supporting our research that proves how virtual work could be additionally valuable when compared to conventional office work as the gains results mostly from how further autonomous remote employees become. Where staffs' independence is reduced and higher micromanaged practices exist, remote-working advantages has a lower probability of occurrence. Therefore, virtual administrators must comprehend the necessary job designs required for facilitating efficient virtual work. Also, evidence prove that remote working has come to stay post-COVID pandemic [40]. Consequently, managers ought to develop innovative delegation and enabling competences

in order to give virtual employees more independence in deciding the appropriate methodologies and time for carrying out their duties as this would enhance staffs' enthusiasm, performances and wellbeing. Lastly, since virtual jobs demands autonomy and flexibility alongside solid self-inspiration and enthusiasm, managers ought to have the ability to aptly determine and decide if an individual has the suitability to work in a virtual group and likewise recognise the individual peculiarities to address when creating work groups.

Limitations

Discussing about limitations encountered during the meta-evaluative procedure is a central aspect of the meta-methods research design [16]. Constraints of this research process where generalization can only be made to organizations whose staffs worked from home during the COVID-19 pandemic due to the sampling types utilized; and insufficient literatures of primary researches that combine the three aspects of SHRM, Remote working and COVID-19. This is understandable as COVID-19 is an emergent issue. Nevertheless, we conducted extensive wide-ranging searches on many search engines to make sure that we make the most of readily available publications within all the continents (excluding Antarctica where no one lives) to make it a truly global study. This gives us confidence that our innovative, one-of-a-kind research and conclusions would contribute to knowledge and applications about SHRM of remote working in this post COVID-19 era.

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Conflict of Interest Statement

The Authors declare that there is no conflict of interest financially or otherwise in the conduct of this research.

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Cost-Effectiveness Analysis of a Community Emergency Transport System for Maternal Care in Northern Ghana

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Abstract

Maternal mortality is a function of economic underdevelopment. Obstetric complications are the major cause of maternal mortality. Early detection, rapid transportation and prompt care utilizing Emergency Obstetric and Newborn Care (EmONC) can help end preventable maternal mortality. However, poor referral transportation limits utilization of lifesaving EmONC in least developed countries. Korea International Cooperation Agency supported Ghana to implement a 5-year Primary Health Care project in Upper East region in 2016. This project had a Community Emergency Transport System (CETS) component. CETS was implemented using customized 'motorking' tricycle ambulances to strengthen maternal referral transportation. We conducted cost-effectiveness analysis to determine CETS' value-for-money (VfM). The incremental cost-effectiveness ratio (ICER) and incremental net-benefit (INB) were estimated. The study perspective was societal. The comparator was traditional transportation system (TTS). The cost-effectiveness threshold was Ghana's GDP for 2020 (USD2,254.15/GH₵11,045.34). The study respondents were women with pregnancy experience in 2020 within the project area who utilize a referral transport. Respondents were randomly selected from CETS and TTS areas. Primary and secondary data were collected at households and health facilities respectively. Data was analyzed with STATA 15.0. The ICER computed was GH₵559.69 (USD114.22). CETS was deemed cost-effective because ICER was below the cost-effectiveness threshold. The net-benefit was GH₵31,456.96 (USD6,419.79). The INB was less than zero (-2002.61) implying CETS was not cost-effective. There was a conflict between ICER and INB on VfM of CETS. Affordability should be considered in Policy adoption.

Keywords: *Community emergency transport system, Cost-effectiveness, Ending preventable maternal mortality, Northern Ghana, Traditional transport system.*

Introduction

Maternal mortality is a function of economic underdevelopment as depicted by the wide variation in lifetime risk of maternal death between rich and poor nations [1]. Every year, nearly 300,000 women die in childbirth globally and millions more suffer serious pregnancy-

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related illness or disability following birth [2, 3, 4]. About 94% of maternal deaths occur in least developed countries (LDC) of sub-Saharan Africa (SSA) and Southern Asia [5]. The global target for ending preventable maternal mortality (EPMM) by 2030 is maternal mortality ratio (MMR) lower than 70 maternal deaths per 100,000 live births and not more than 140 per 100,000 live births in countries with very high burdens [6]. Ghana, a SSA country is among countries with high MMR of 310 deaths per 100,000 live births [7].

The major causes of maternal morbidity and mortality are hypertensive disorders of pregnancy, hemorrhage, sepsis, obstructed labor, ruptured uterus and unsafe abortion [2, 3]. Maternal deaths mostly occur around time of birth from obstetric complications [8]. These complications are often unpredictable and estimated to affect 15% of pregnant women [8, 9, 10]. Management of obstetric complications requires specialized care of Emergency Obstetric and Newborn Care (EmONC) [9, 10]. The EmONC is a strategy for reducing maternal and neonatal mortality by focusing on identification, referral and treatment of women with obstetric complications [2]. Maternal mortality and stillbirth rates correlate highly with access to EmONC [2].

In 1994, Thaddeus and Maine introduced the concept of three delays to contextualize factors contributing to maternal mortality from obstetric complications. These delays were delay in decision making to seek care, delay in reaching the health facility and delay in provision of prompt care at the health facility [11]. The second delay, which is due to poor referral transportation to an EmONC facility is most neglected in LDC [12] and known to be responsible for a significant proportion of maternal and newborn deaths in these countries [9]. In Ghana, one in every five births occur at home with no access to skilled attendant especially in rural areas due mainly to poor access to referral transportation [7].

In 2016, Korea International Cooperation Agency (KOICA) supported Ghana to implement a 5-year Primary Health Care (PHC) project titled "Project for improving community-based primary health care through Community-based Health Planning and Services (CHPS) strengthening *(CHPS+)"*. Among other interventions, this project implemented a Community Emergency Transport System (CETS) for maternal care using customized 'motorking' tricycle ambulances. The PHC project was implemented in 120 CHPS zones. CHPS zone is a 'national mechanism to deliver essential community-based health services involving planning and service delivery with communities. It refers to a demarcated geographical area of a 4-kilometer radius and between 4500-5000 persons or 750 households in densely populated areas' [13]. The 120 project CHPS zones were selected with the primary criteria based on quality in terms of equipment and supplies availability, personnel and infrastructure. This strategy obtained the overall measure of quality of each facility, rank them in order of quality and selected the 120 least endowed CHPS zones for project implementation. The overall measure of quality was obtained from principal components analysis (PCA) to extract relevant variation. In all, 249 different indicators of quality of CHPS zones were used in the PCA analysis for CHPS zones with compounds (health facility structure) while 181 different indicators were used for PCA analysis for CHPS zones without compounds [14]. Once the 120 CHPS zones were selected, random sampling into the three intervention arms of Community Health Volunteer (CHV) incentives, Sustainable Emergency Referral System (SERC) or CETS and SERC/CETS with incentives. The random selection was done using the sample command in STATA with stratification by district. CETS was rolled out in a staggered fashion [14]. This paper examined the cost-effectiveness of implementing CETS to strengthen referral transportation system for improved access to

emergency maternal care compared to Traditional Transport System (TTS) in rural and impoverished communities in the Upper East region of Ghana.

Materials and Methods

Study Area

This study was conducted in Upper East region of Ghana, located in the northeast corner of the country. It occupies a land mass of 8,842 km^2 (2.7%). The region's projected population in 2020 was 1,302,718 with an annual growth rate of 1.2% and total fertility rate of 4.9. Women in fertility age (WIFA) were 312,652 and annual expected pregnancies was 52,109. The traditional transport system (TTS) in the region comprised of commercial minibuses, taxis, pickup vehicles, private cars, tricycles, motorcycles, bicycles, donkey carts and walking [15].

Study Design

A cost-effectiveness analysis study was conducted on CETS intervention for maternal care. The societal perspective which involved the estimation of both individual women perspective and provider perspective was applied in the analysis. The study evaluated the costs and effects of CETS intervention by measuring the difference in the maternal consequences of referral transportation with use of customized motorking tricycle ambulances and the comparator, TTS. The study measured the incremental cost-effectiveness ratio (ICER), net benefit and incremental net benefit (INB).

Study Population and Sampling Strategy

The study population was all women aged 15 - 49 years with experience of pregnancy within the period January to December 2020 in the 120 CHPS zones of the CHPS+ project in Upper East region of Ghana. This included reference populations that accessed a health facility using a referral transport and excluded referenced populations that did not access a health facility and also did not utilize a referral transport. Using Taro Yamane formula, $n = \frac{N}{1+Ne^2}$ for proportions [16] at a precision level (e) of 0.05 with N, as the population (1,302,718), the sample size estimated was 400. The final sample size was 440 after adding 10% for non-response.

The study adapted the CHPS+ project implementation sampling strategy to select 50 CHPS zones with CETS intervention and 50 CHPS zones with TTS. A multi-staged random selection was used to select at least one community and households from the selected CHPS zones. In each of the selected households, all females aged 15 - 49 years with pregnancy experience between January1 – December 31, 2020, in the household who met the inclusion criteria were selected into the sample until a sample of 5 respondents was achieved. In all 440 respondents constituting the sample were selected made up of 220 CETS and 220 TTS.

Variables and Data Collection

Primary and secondary data were collected. A structured tool was used to collect primary data from respondents at the household level through face-face interviews. The data collected included socio-demographic, means of referral transport to health facility for childbirth and obstetric emergency as well as all Out-Of-Pocket (OOP) payments made during the period. Secondary data on these respondents were extracted from obstetric records at respective health facilities. Data was also extracted from project records and ambulance logs. Data were collected using an electronic platform, KoBoCollect.

Cost data on CETS intervention was extracted from project records and reports. The capital costs made up of purchase price of customized motorking tricycle ambulance, vehicle registration with Vehicle Driver Licensing Authority (VDLA) and recurrent costs including insurance premium were extracted from project accounting. The recurrent costs of maintenance/repair cost, fuel cost, driver's allowance/time, incentives, mobile phone communication cost and cost of logistics provided in tricycle ambulance were extracted

from ambulance logs. Respondents provided cost information on transportation, caregivers, and medical services at the household level. Medical costs were also extracted from the health facility records. The costs were estimated for both CETS and TTS.

Data Analysis

STATA 15.0 was used for data analysis and both descriptive and inferential analysis were carried out. The descriptive analysis was conducted on socio-demographic variables, obstetric care variables and transportation and communication variables. The results were presented with p-values to measure the significant differences between variables of interest. The Pearson Chi-Square statistical procedure was used to determine association between variables. The inferential analysis was carried out to determine factors that were associated with households' increased ICER and net benefit.

Measurement of Health Effects

The health effects to the respondents in both intervention and comparator areas was the number of complications detected and attended to at health facilities which was represented as Maternal Near Miss (MNM). We used the adapted sub-Saharan Africa criterion to classify MNM [17].

The maternal complications were severe pre-eclampsia/eclampsia, prolong labor, cephalo-pelvic disproportion, antepartum hemorrhage, severe anemia, blood transfusion, cord prolapse, emergency caesarean section, postpartum hemorrhage, hysterectomy, and abortion complications. Women who met the outcome criterion were classified as 'effective transfers' and all other women were 'non-effective transfers' for both CETS and TTS. Thus, the health effects (outcome) to the respondents in both CETS and TTS areas were the number of MNM cases detected and transported to health facilities (effective transfers) to avert maternal death.

Measurement of Costs

Mean costs were used for the analysis. The individual (patient) cost analysis involved the summation of direct medical costs and direct non-medical costs. The direct medical cost involved OOP for delivery (Delivery costs) and complications (Treatment of complications) related costs. Direct non-medical costs included OOP for transportation to and from health facility (patient transport cost) and caregiver transport cost (Caregiver cost) during care for the woman at the health facility. The provider costs included CETS intervention costs such as motorking tricycle ambulance cost, Servicing/Maintenance cost of ambulances, tricycle ambulance insurance premium per year, Tricycle ambulance registration cost by Driver Vehicle Licensing Authority, training of riders/drivers cost, driver call credit, driver incentive and other related running cost. Capital cost (cost of motorking tricycle ambulances) was annualized by discounting to allow for differential timing of capital costs over the useful life, thus obtaining equivalent annual cost. A discount rate of 3% and a useful life of 5 years was used to compute the equivalent annual cost. A discount rate of 3% was chosen, which is usually the rate used in most economic evaluation studies conducted in developing countries [18, 19] and based on expert opinion and literature review, a useful life of 5 years was used for motorking tricycles [18, 20]. Annual equivalent cost of the capital cost was estimated by dividing the total cost (GH₵967,750) of motorking ambulances by the annuity factor (4.58). The annuity factor was obtained from annuity table [18, 21] and using 3% discount rate and 5 years useful life. The mean provider cost and the individual cost were used.

Cost-effectiveness Analysis

Cost-effectiveness analysis compared the incremental difference in costs to the incremental difference in effectiveness [3]. The incremental cost-effectiveness ratio (ICER) was used to compute the cost-effectiveness of the

CETS intervention. The ICER is expressed as the ratio of the difference in cost to the difference in effect between the two comparators as presented in the formula:

$$ICER = \frac{(Mean\ cost\ of\ A - Mean\ cost\ of\ B)}{(Mean\ effect\ of\ A - Mean\ effect\ of\ B)}$$

where A is the CETS intervention and B is the TTS comparator.

To determine the cost-effectiveness of an intervention, ICER needs to be compared with a threshold. The cost-effectiveness threshold or maximum acceptable Willingness-to-pay [WTP] set prior to the study was Ghana's GDP per capita for 2020 = USD2,254.15 [22] as recommended by WHO [23]. Using the 2020 average exchange rate of 1USD = GH₵4.9, the GDP per capita was converted to GH₵11,045.34. An intervention is considered cost-effective if ICER is below a set threshold.

Net Benefit Framework Analysis

The net benefit regression analysis was done using the ordinary least square (OLS) regression to estimate incremental net benefit (INB) of CETS intervention. The mean costs and effects for both CETS and TTS were used in the regression equation. With this analysis, confounders of cost-effectiveness were controlled. The net benefit framework used linearization of ICER, thus

$$\frac{\Delta C}{\Delta E} = ICER$$

where ΔC was incremental cost and ΔE incremental effect. ICER was replaced by a ceiling ratio, R_o (R_o is maximum acceptable willingness to pay, and in this case R_o = GDP per capita for Ghana in 2020, » $\Delta C = \Delta E * R_o$. The net benefit statistic was computed as, $\Delta E * R_o - \Delta C = \Delta NB$. For an individual, the net benefit statistic was, $NB_i = \Delta E_i * R_o - \Delta C_i$. This equation was similar to the traditional regression equation,

$$Y_i = \alpha + \beta CET_i + \delta' X_i + \varepsilon_i$$

where Y was the dependent variable; δ was a vector of parameters estimated as coefficient of explanatory variable, CET in the intervention was a dummy variable that took a value of 1 for a pregnant woman who used CETS and 0 for a pregnant woman who used TTS arm, X was a vector of covariates of the woman, α was the intercept (constant) and ε was the error term [24]. The effect of CETS was estimated by β, as incremental net benefit of CETS. The results were interpreted as follows: If the coefficient, β is positive or > 0, then the incremental benefit for additional one unit of effectiveness is below the ceiling ratio, R_0, the intervention (CETS) will be deemed cost-effective compared to the TTS comparator. Similarly, if the coefficient, β is negative or < 0, then the incremental cost for additional one unit of effectiveness is above the ceiling ratio, R_0, and the standard, comparator (TTS) will be deemed more cost-effective than the intervention. The independent variables associated with increased net benefit were adjusted to determine their impact on the probability that CETS was cost-effective. Net benefit sensitivity analysis was done by varying GDP per capita (WTP) from 0-50,000 representing an increase and decrease in GDP per capita and the effect on net benefit determined.

Factors Associated with Households' Increased ICER and Net-Benefit

To determine the factors that were associated with households' increased ICER, Ordinary Least Squares (OLS) regression was used. The outcome variable was ICER (continuous variable) and the independent variables were intervention area (dummy variable, 1=Intervention; 0= No intervention), education (categorical variable), occupation (categorical variable) and distance (categorical variable).

In addition, factors associated with households' increased net-benefit were determined using OLS regression. The outcome variable was net benefit (continuous variable) and the independent variables were intervention area (dummy variable, 1=Intervention; 0= No intervention), education (categorical variable),

occupation (categorical variable) and distance (categorical variable).

Sensitivity Analysis

A one-way sensitivity analysis was conducted to determine whether changes to important variables will significantly change the results. In doing so, discount rates were varied to determine the effects on ICER. This was carried out to test the extent to which the uncertainty in the ICER value was attributable to the impact of discount rates on the parameter. A discount rate of 0%, 6% and 10% were used for the sensitivity analysis. Net benefit sensitivity analysis was done to ascertain the extent of uncertainty in the net benefit resulting from variations of WTP value. WTP represented as 2020 GDP per capita for Ghana, was varied from 0 to GHC50,000.

Results

Socio-demographic Characteristics

Primary data on 416 respondents made up of 214 (51.4%) CETS and 202 (48.6%) TTS were analysed. The ages of respondents ranged from 15-45 years with a mean of 27.4±6.4 years for CETS respondents compared to 15-47 years with a mean of 27.3±6.4 years for TTS respondents. Almost all the respondents (97.7% CETS and 98.0% TTS) were married. Majority of respondents were Christians. Over two-fifths of the respondents (40.2% CETS and 42.0% TTS) had no formal education and only 9.4% CETS and 6.4% TTS respondents had tertiary education. The most common occupation for both CETS and TTS respondents were farming and then trading. Ethnic composition of respondents was different ($p<0.001$) between CETS and TTS respondents. Fundamentally, respondents from both CETS and TTS were similar with respect to socio-demographic characteristics except for ethnic composition.

Physical Access and Means of Referral Transportation to EmONC Facilities

The main means of referral transport to health facility for childbirth was motorking tricycle ambulance (78.4%) for CETS women compared to motorbike (56.3%) for TTS women. The difference in referral transport for childbirth between the two groups was statistically significant ($p <0.001$). Similarly, the means of transport during obstetric emergency was motorking tricycle ambulance (60.6%) for CETS respondents and motorbike (73.6%) for TTS respondents. The variation in utilization of means of referral transport for obstetric emergency was statistically significant ($p<0.001$). About 70% of respondents in both CETS area and TTS area lived within 5 kilometres of an EmONC health facility.

Health Effects for CETS and TTS Respondents

MNM was used as the effectiveness indicator and in all, there were 47 MNM that affected 11.3% of respondents. These constituted effective transfers of 25 (53.2%) health effects for CETS women and 22 (46.8%) health effects for TTS women (Table 1).

Table 1. Effects of the Intervention and Comparator Women

Variable	Category	Total health effects (n)	Intervention (n)	Comparator (n)
Type of complication and critical intervention	Severe pre-eclampsia/ Eclampsia	5	1	4
	Severe Pre-eclampsia/Eclampsia &C/S	5	3	2
	Prolong labour, CPD & C/S	2	2	0
	APH &C/S	2	1	1

	Severe Anemia + Blood transfusion	10	7	3
	C/S + PPH + Blood transfusion	1	1	0
	Cord prolapse+ C/S	1	1	0
	Emergency caesarean section	19	8	11
	Ruptured uterus + C/S + hysterectomy	1	0	1
	Septic Abortion	1	1	0
Total Health Effects		**47**	**25**	**22**

C/S- Caesarean section; CPD- Cephalo-Pelvic Disproportion; APH- Antepartum Hemorrhage; PPH- Postpartum Hemorrhage

Cost of CETS Intervention and TTS Comparator

The average provider cost (CETS intervention cost) was GH₵1,732.53. The total individual average cost for women in CETS intervention group was GH₵121.81 and those in TTS comparator group was GH₵168.45. Overall, the mean societal cost for the intervention and the comparator were GH₵1,847.51 and GH₵168.45 respectively with the intervention more costly by GH₵1,679.06. In both the CETS and TTS arms, the cost of treating complications represented the highest cost component of the individual cost (Table 2).

Table 2. Cost of the Intervention and the Comparator

Cost variables	**Intervention (Mean, GH₵)**	**Comparator (Mean, GH₵)**
Average intervention/provider cost*	1,732.53	-
Individual cost		
Cost of delivery	99.16	129.58
Treatment for complications	218.33	410.00
Transport cost	23.55	27.25
Caregiver cost	131.67	75.00
Mean total cost	***121.81***	***168.45***
Overall mean cost	***1847.51***	***168.45***

*The average cost is the total cost of intervention divided by the number of women in the intervention arm(N=214). GH₵4.9 = 1USD

Cost-effectiveness Estimation

Based on the incremental cost of GH₵1,679.06 and the incremental effect of 3, the corresponding ICER was GH₵559.69 (114.22 USD). The ICER was the additional resources required per additional maternal near miss (obstetric complication) case to be transported to a health facility for treatment (effectiveness). The net benefit of CETS was GH₵31,456.96 (USD6,419.79) (Table 3).

Table 3. Cost-Effectiveness Estimates

Group variables	**Mean**
Overall analysis	-
Comparison district (N = 202)	-
Cost (GHC)	168.45

Effect	22
Intervention district (N = 214)	-
Cost (GHC)	1847.51
Effect	25
Incremental Cost (GHC)	1,679.06
Incremental Effect	3
ICER	**559.69**
WTP=GDP per capita	11,045.34
Net Benefit*	31,456.96

*Net Benefit= (Incremental Effect * GHC11,045.34)- Incremental cost. GH₵4.9 = 1USD

Effects of Covariates on the Overall ICER of CETS Intervention

The regression results on the association between women background characteristics and the ICER showed that variables of intervention area, education, distance to health facility and occupation explain about 95% (R square=0.9494) of ICER (Table 4). The intervention Area ($p < 0.01$) and education ($p < 0.05$) were the statistically significant variables that determine change in ICER.

Table 4. ICER Regression Estimates with Covariates

ICER	Coefficient	Std. Err.	P-Value	[95% Conf. interval
Area				
Comparator (B)				
Intervention	667.54	7.07	0.00***	653.64, 681.43
Education				
No education(B)				
Middle/JHS	-7.66	9.93	0.44	-27.18, 11.86
Primary	-1.55	6.37	0.81	-14.07, 10.98
SHS/Vocational	13.18	20.49	0.52	-27.09, 53.45
Tertiary	69.89	30.23	0.02**	10.47, 129.32
Distance				
Less than 1 km(B)				
1-5 km	-13.99	9.76	0.15	-33.17, 5.18
Above 5 km	-8.77	11.87	0.46	-32.10, 14.57
Don't know	-47.68	44.43	0.28	-135.03, 39.67
Occupation				
Housewife(B)				
Artisan	-22.48	23.41	0.34	-68.50, 23.53
Farming	10.76	15.75	0.50	-20.21, 41.72
Formal/salaried employee	-32.23	28.58	0.26	-88.41, 23.94
Trading	2.49	14.41	0.86	-25.84, 30.82
_cons	-46.74	19.85	0.02	-85.76, -7.72

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; B represents the base category

ICER Sensitivity Analysis

Sensitivity analysis showed that using a discount rate of 0% (no discounting of intervention cost), resulted in an ICER value of GH₵1,737.96 which is lower than the cost-effectiveness threshold. An increase in discount rate from 0% to 3% resulted in a reduction of ICER value to GH₵559.69 which presented the intervention to be more cost-effective. However, when the discount rate was increased from 3% to 10%, ICER value increased slightly from GH₵559.69 to GHC628.29, still cost-effective but suggested that ICER is sensitive to discount rate and increasing discount rate increases ICER (Table 5).

Table 5. ICER Sensitivity Analysis

Sensitivity parameters	**Intervention**		**Comparator**		**Incremental**		**ICER**
Discounting	Costs GH₵	Ben	Costs GH₵	Ben	Costs GH₵	Ben	
0%	5382.33	25.00	168.45	22.00	5213.88	3.00	1737.96
3%	1847.51	25.00	168.45	22.00	1679.06	3.00	559.69
6%	1934.29	25.00	168.45	22.00	1765.84	3.00	588.61
10%	2053.32	25.00	168.45	22.00	1884.87	3.00	628.29

Ben= Benefit; GH₵4.9 = 1USD

Net Benefit Framework Analysis

The net benefit analysis showed that CETS intervention was statistically significant ($p < 0.01$) but the coefficient of the CETS intervention dummy, INB was -2002.6, a value less than zero (Table 6), controlling for covariates of education, distance to health facility, and occupation in the model. This suggests the intervention is not cost-effective when these covariates are included in the model.

Table 6. Net Benefit Regression Estimates with Intervention and Covariates

Net Benefit	**Coefficient**	**Std. Err.**	**P-Value**	**[95% Conf. Interval]**	
Area					
Comparator (B)					
Intervention	-2002.61	21.20	0.00***	-2044.29	-1960.92
Education					
No Education (B)					
Middle/JHS	22.98	29.79	0.44	-35.59	81.55
Primary	4.65	19.12	0.81	-32.93	42.22
SHS/Vocational	-39.53	61.46	0.52	-160.35	81.28
Tertiary	-209.68	90.68	0.02**	-387.95	-31.41
Distance					
Less than 1 km(B)					
1-5 km	41.98	29.27	0.15	-15.55	99.51
Above 5 km	26.31	35.61	0.46	-43.70	96.31
Don't know	143.04	133.30	0.28	-119.01	405.08
Occupation					
Housewife(B)					
Artisan	67.45	70.22	0.34	-70.59	205.49
Farming	-32.27	47.25	0.50	-125.17	60.62
Formal/salaried employee	96.70	85.73	0.26	-71.83	265.23

Trading	-7.46	43.23	0.86	-92.45	77.53
_cons	6902.68	59.55	0.00	6785.61	7019.74

* p < 0.1, ** p < 0.05, *** p < 0.01; B represents the base category

Net Benefit Sensitivity Analysis

Net benefit sensitivity analysis was done to ascertain the extent of uncertainty in the net benefit resulting from the WTP value. As the WTP value increases, the net benefit value increases and vice versa (Table 7). Thus, net-benefit was sensitive to values of WTP.

Table 7. Net Benefit Analysis with Varying Ceiling Ratios (WTP=GDP per Capita)

	Intervention			Comparator		Incremental Cost (GH₵)	Incremental Benefit	Net Benefit
	WTP (GH₵)	Cost (GH₵)	Benefit	Cost (GH₵)	Benefit			
R0	0	1847.51	25	168.45	22	1679.06	3	-1,679.06
R1	5,000.00	1847.51	25	168.45	22	1679.06	3	13,320.94
R2	10,000.00	1847.51	25	168.45	22	1679.06	3	28,320.94
R3	15,000.00	1847.51	25	168.45	22	1679.06	3	43,320.94
R4	20,000.00	1847.51	25	168.45	22	1679.06	3	58,320.94
R5	25,000.00	1847.51	25	168.45	22	1679.06	3	73,320.94
R6	30,000.00	1847.51	25	168.45	22	1679.06	3	88,320.94
R7	35,000.00	1847.51	25	168.45	22	1679.06	3	103,320.94
R8	40,000.00	1847.51	25	168.45	22	1679.06	3	118,320.94
R9	45,000.00	1847.51	25	168.45	22	1679.06	3	133,320.94
R10	50,000.00	1847.51	25	168.45	22	1679.06	3	148,320.94

*Net benefit= (Incremental benefit * WTP)- Incremental cost; GH₵4.9 = 1USD

Discussion

This study evaluated the cost-effectiveness of CETS intervention in comparison to TTS comparator. The socio-demographic characteristics of women in both CETS and TTS areas were fundamentally the same. Additionally, about 70% of the women in both CETS and TTS areas were resident within 5 kilometers of an EmONC facility. Therefore, majority of the women in the study had good access to obstetric services in accordance with Vanden Broek et al. [25]. However, there was statistically significant difference between women in CETS areas and those in TTS areas with respect to type of referral transport used to access health facility care during childbirth and treatment of obstetric complications. Whilst the women in CETS area used mostly motorking tricycle ambulances, the women in TTS mostly used motorbikes to health facilities for both childbirth and management of obstetric complications. The high patronage of motorking tricycle ambulance by pregnant women in CETS areas implied acceptance of this mode of referral transportation in comparison to the motorbike. This finding was comparable to that in Malawi where customized motorcycle ambulance was found to be more affordable means of referral transportation conveying large numbers of women from primary health facilities to district hospitals compared to 4-wheel ambulance [9].

In this study, the incidence of MNM was 11.30% compared to Ethiopian studies that reported 16.1% and 20.8% [26 and 27]. This proportion was lower than the estimated 15% of pregnant women likely to have obstetric complications [8-10]. Women in CETS area had slightly more MNM than women in TTS area but the cost of treating obstetric complications was higher in TTS women. The higher treatment cost for TTS women could be due to worsen state of

complications before arrival at the health facility due to delays with TTS means of referral transportation due possibly to cost compared to CETS which was free for the women.

The estimated ICER for CETS was GH₵559.69 (114.22 USD). This value was lower than Ghana's 2020 GDP per capita of GH₵11,045.34 (2,254.15 USD), the a priori cost-effectiveness threshold of the study. CETS was therefore deemed a cost-effective intervention [23]. The Gini index of Ghana in 2020 was 0.44 corresponding to high income disparity, making GDP per capita ineffective especially to the ordinary person [28]. According to WHO guide to cost-effectiveness analysis, an intervention with ICER less than USD150 is attractive [23]. CETS intervention was thus considered an attractive intervention since ICER was less than USD150. Furthermore, the intervention area, covariates of education, distance to health facility and occupation explained 95% (Coefficient of determination, R square =0.9494) of ICER. This measured the correlation between the dependent and the independent variables and explained how much of the variability in the dependent variable was due to the independent variables. Since the R square was higher than 80%, it corresponds to a perfect goodness of fit [29]. Furthermore, the intervention area and education covariate were statistically significant variables that determined change in ICER of CETS. The relationship between the regression model and the dependent variable (ICER) was therefore perfect since almost all the variance in ICER is predictable by covariates of intervention area, education, distance to health facility and occupation collectively [30, 29]. The one-way sensitivity analysis on ICER showed that the ICER was sensitive to the discount rate with a positive correlation. The discount rate was therefore a source of uncertainty in the estimated ICER value. This finding was comparable to that of Bae et al. where discount rate was reported as the second highest structural uncertainty that impacted ICER in the evaluation of uncertainties in the pharmacoeconomic dossiers [31]. The discount rate as used in the estimation of ICER in this study was therefore an important source of uncertainty in VfM evaluation [32] and needs to be considered in decision making on cost-effectiveness of CETS.

The estimated net benefit of CETS which was the difference in benefit between CETS and TTS was GH₵31,456.96 (USD6,419.79). Since the net benefit was greater than zero, then CETS was superior and more beneficial than TTS [24]. Additionally, the net benefit regression analysis found that CETS intervention was statistically significant ($p<0.01$).

However, the INB, the coefficient of CETS intervention dummy was less than zero (-2002.61) implying the incremental cost of CETS was above the maximum acceptable provider WTP (Ghana's GDP per capita for 2020, USD2,254.15). Since the INB estimated the difference in value between extra benefits and extra costs of CETS and TTS and that value was -2002.61, the intervention was considered not cost-effective by INB [24, 33, 34, 35]. These covariates therefore had confounding effect on cost-effectiveness of CETS [36]. Consequently, by INB, TTS was deemed more cost-effective than CETS based on higher cost compared to health benefit gained [24, 33, 37, 38, 39]. In this study, net benefit was also sensitive to WTP with positive correlation. WTP was therefore a potential source of uncertainty in the estimated net benefit value [33, 38]. The ICER and INB methods were used to compute cost-effectiveness of CETS in this study. The ability of net benefit approach to address uncertainties associated with ICER by adjusting or controlling for confounding variables make it superior to ICER [38]. The INB value of -2002.61 was therefore equivalent to ICER value of 559.69 except that INB value was adjusted by addressing for confounding variables [36, 40].

Limitations of the study

The limitations of this study were recalled bias from respondent and some poor

documentation in secondary data sources. However, we belief that the probing techniques used in collecting data reduced the recall bias. Additionally, the assumption that the decision making to seek care at health facilities and quality of care at the health facilities were same for women in both CETS and TTS areas could be incorrect. Furthermore, there was element of some contamination in the comparator area where some women used motorking tricycle ambulance which was exclusive for CETS area, and this could have suppressed the effects of the CETS. Notwithstanding, we belief the limitations had minimal effect and the results are robust, comparable, and relevant for policy decisions.

Conclusion

An economic evaluation of a new intervention is important to determine its value-for-money before adoption to ensure prudent use of scarce health resources. The CETS intervention was cost-effective by ICER and had high positive net benefit. Based on the foregoing, CETS intervention is recommended for adoption. However, the incremental net benefit (INB) revealed that CETS intervention was not cost-effective since the incremental cost was above the maximum provider willingness to pay. There was therefore a conflict between ICER and INB on the cost-effectiveness of CETS intervention. Affordability of the new intervention within the context of the specific health system should be considered in policy decisions for such situations where ICER and INB conflict with respect to cost-effectiveness.

Declarations

Author Contribution Statement

WKO conceived and designed the study. WKO, POA and BA conducted the study. MAD, WKO and POA analyzed and interpreted the data. WKO, POA, MAD, BA, JK and TA contributed resources, materials, analysis tools or data. All authors read and revised the manuscript and gave final approval of the manuscript.

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Data Availability Statement

The datasets used and analyzed during the current study are available upon reasonable request.

Ethical Approval

Ethical approval was obtained for the study with number GHS-ERC:016/01/22 from the Ghana Health Service Ethics Committee.

Declaration of Interest Statement

The authors declare that they have no competing interest.

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The Impacts of Antiretroviral and Antifungal Treatments, and Tuberculosis Co-infection on Mortality and Relapse in Patients with *Talaromyces Marneffei* Infection

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Abstract

To date, clinical data on long-term clinical outcomes, including 6-month mortality and relapse in talaromycosis (Tm) patients and impacts of ART and secondary antifungal prophylaxis are still lacking. We conducted a secondary data analysis from 6-month prospective observation of patients with culture-confirmed talaromycosis who participated in the Itraconazole versus Amphotericin B for HIV-associated Talaromycosis (IVAP) trial. The primary outcome was 6-month Tm mortality, while the secondary outcome was relapse. Multivariable Cox proportional hazard models were used to identify predictors of outcomes of interest. The median patient age was 34 years (IQR:30 – 38). The median pre-ART CD4 counts at baseline were 10 (IQR: 5-21) cells/µL. The cumulative 76/435 (17.4%) patients died, and Tm relapse was observed in 18/435 (4.1%) patients. The multivariable analyses showed that strong independent predictors of 6-month Tm mortality included ineffective ART (either absence of ART or ART failure) (HR = 6.26, 95% CI: 3.95 – 9.92, P < 0.001), and TB co-infection (HR =1.98, 95% CI: 1.23 – 3.17; P < 0.01). Induction antifungal treatment with itraconazole versus amphotericin B deoxycholate was significantly associated with Tm death in the univariable model, however, it became insignificant in the multivariable model. In addition, the significant risk factors for Tm relapse were ineffective ART, induction antifungal treatment with itraconazole than intravenous amphotericin B, and shorter duration of itraconazole secondary prophylaxis after completing induction therapy in-hospital (all with significant P-values). Antiretroviral therapy, antifungal treatment and tuberculosis co-infection were main predictors for 6-month Tm fatality as well as relapse.

Keywords: *Invasive fungal infections, Mortality, Relapse, Talaromyces marneffei, Vietnam.*

Introduction

Talaromyces marneffei (Tm) is a dimorphic fungus that can cause a life-threatening systemic infection in immunocompromised individuals living in or traveling to Southeast Asia and southern China [1, 2]. The Tm mortality on antifungal therapy ranges from roughly 10% to 30% [3-7]. In the IVAP trial, approximately 20% of talaromycosis patients died within six months after admission, and roughly 10% of those who responded successfully to in-hospital intensive antifungal therapy further developed disease relapse or Tm IRIS after discharge [8]. Importantly, talaromycosis was reported to have a high relapse rate of 57% if patients were not maintained on itraconazole for secondary prophylaxis after a period of consolidation therapy (itraconazole 200 mg, orally twice daily

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for 12 weeks), and the median time to relapse was 6 months after the induction treatment in a Thai series [9]. Another study in Thailand in 2007, 33 HIV-infected patients with talaromycosis received itraconazole as a secondary prophylaxis against talaromycosis and ART for a median follow-up of 18 months (range, 06-45 months). The incidence rate of talaromycosis relapse was zero case per 641 person-months (95% CI: 0-0.06 cases per person-months), and CD4 cells count increased by 100 cells/μL after 6 months of ART [10]. These studies were limited by either relatively small sample size or retrospective design. Markedly, the IVAP trial demonstrated that disseminated *T. marneffei* infection, disease relapse, HIV co-infections (particularly tuberculosis), as main causes of death among Tm patients during 6 month of study follow up.

Therefore, we conducted this study to study the incidence and risk factors for 6-month mortality and relapse among participants with *Talaromyces marneffei* in the IVAP trial, with focus on studying the impacts of antiretroviral therapy and antifungal treatments, and tuberculosis co-infection in talaromycosis patients. In addition, regarding poorer prognosis in patients with relapse than Tm IRIS, I will evaluate a set of clinical and laboratory features that can be helpful in differentiation between these two disease complications.

Materials and Methods

Ethics Statement

We used a secondary dataset from IVAP trial, "the Itraconazole versus Amphotericin B for HIV-associated Talaromycosis clinical trial", which was published in NEJM in 2017 [8]. The IVAP trial was approved by the independent ethics committee at each participating hospital, by the Vietnam Ministry of Health, and by the Oxford University Tropical Research Ethics Committee. The study dataset was permitted and provided by the principal investigator. All participants' names had been de-identified and the secondary dataset was manipulated in compliance with the principle in Good Clinical Practice and Helsinki Declaration. Using secondary dataset was causing less than minimal risk to study participants, in this respect the ethical clearance for this study was suggested to be waived off.

Study Setting, Design and Population

All 435 adult patients with culture-confirmed Tm infection who participated in the IVAP trial were included in the analysis. In brief, the IVAP trial recruited adult patients with Tm infection from five referral hospitals across Vietnam between October 2012 and December 2015 [8]. All patients were followed monthly to be assessed for clinical outcomes including deaths and disease relapse during 6 months of study participation. The study flowchart of IVAP participants during 6 months of prospective follow-up is presented in Figure 1

Study Definitions

Talaromycosis was defined as any disease conditions that *Talaromyces marneffei* was isolated from blood, skin scrapings, lymph node, bone marrow and/or anybody fluid samples [3, 8]. Isolation and identification of *Talaromyces marneffei* was performed in accordance with the standard culture techniques.

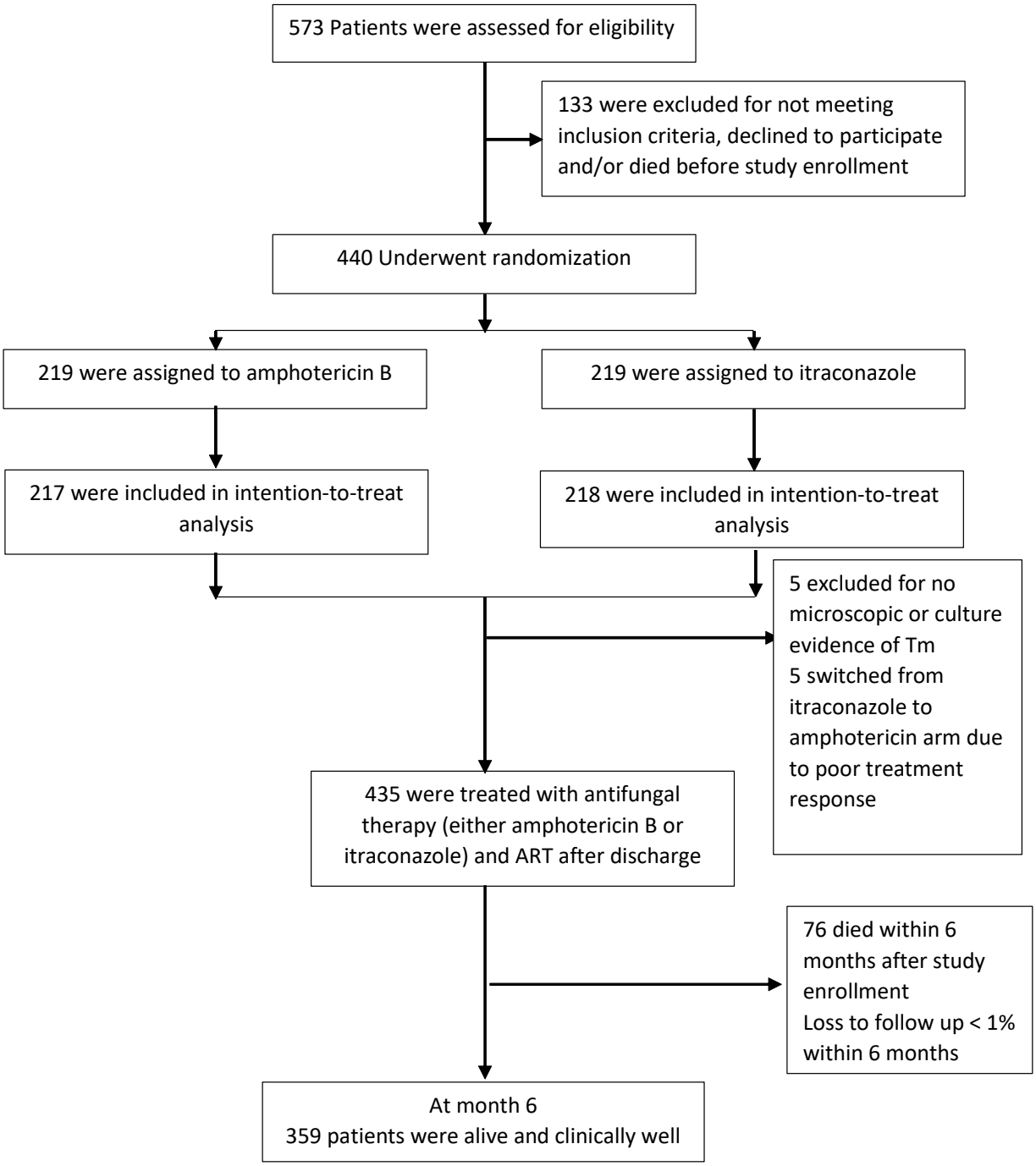

Figure 1. Study Flowchart of Study Participants during 6-Month Follow-up

Paradoxical Tm IRIS was defined as the "paradoxical" worsening of previously resolved symptoms of Tm infection which occurred in the context of effective antifungal treatment and ART therapy and/or increasing CD4 cell counts and excluded the non-compliance of antifungal and ART regimens [8, 11].

Disease relapse was defined as the recurrence of symptoms of previous Tm infection and a positive fungal culture from any sterile site, which occurred in the context of previously ineffective antifungal treatment and either not yet receiving ART or ART failure [3, 8].

Study Outcomes and Candidate Predictors

The primary endpoint was the development of Tm mortality within six-month follow-up period, while the secondary endpoint was Tm relapse. A set of pre-defined covariates included patient age, sex, the baseline CD4 cell count before starting ART, type of induction fungal therapy (itraconazole versus amphotericin B deoxycholate), antifungal secondary prophylaxis with itraconazole, tuberculosis co-infection and ART status (not on ART, ART failure, and effective treatment on ART). These candidate predictors were pre-determined on the basis of the disease pathogenesis and our clinical knowledge.

Data Collection

We used the de-identified secondary dataset from IVAP trial from October 2012 to December 2015 [8]. The study dataset was permitted and provided by the principal investigator.

Statistical Analysis

Descriptive analyses were performed for baseline characteristics of patients, using means (standard deviation (SD) for continuous variables and absolute count (%) for categorical variables. The complete-case analyses with univariable and multivariable Cox proportional hazards model was used to identify the clinical predictors of 6-month Tm death and relapse, based on the pre-defined sets of covariates. Time-to-event was the time from primary Tm infection diagnosis at study enrolments to death and relapse events.

The backward stepwise model selection was proceeded. Based on the parameters of AIC and BIC, the best predictive model was selected. Additionally, we used the Wilcoxon rank sum test for pairwise comparisons between Tm IRIS and disease relapse to identify important factors which can be used to distinguish those disease conditions. All analyses were conducted with R software, version 4.2.2 [12].

Results

Baseline Characteristics of Participants in IVAP Study

The mean age of patients was 35 years (standard deviation, SD = ± 7.4 years), and 69 % was male sex. The mean CD4 cell count at study enrolment was 22 cells/μL (SD = ± 47). Tuberculosis co-infection was observed in 19.6 % of study participants. A majority of participants (> 90%) were recommended and received ART during 6-month participation. Roughly 12.4 % of patients had the first-line ART failure (clinical, immunological and/or virological criteria). Induction antifungal treatments were randomized by ratio 1:1 with either intravenous amphotericin B or oral itraconazole in the IVAP trial, then all Tm patients would continue secondary itraconazole prophylaxis for 6 months on study participation after hospital discharge. The mean length of itraconazole prophylactic treatment was 5.3 months, (SD = ± 1.8), considering short duration of itraconazole intake among Tm patients experiencing death outcome.

Patients' Outcomes within 6-month Follow-up

Amongst the total of 435 participants, 76/435 (17.4%) patients died, and 18/435 (4.1%) patients experienced Tm relapse during 6 months of prospective observation in IVAP study. Notably, 06/18 (33%) patients with Tm relapse died of persistent high Tm burden and/or ineffective ART.

Risk Factors for 6-month Mortality in Patients with Talaromycosis

Table 1 presents the univariable and multivariable Cox proportional hazard models to identify risk factors for mortality of Tm patients during 6 months of follow-up. The multivariable Cox proportional hazard analyses showed that strong independent predictors of 6-month Tm mortality included either absence of ART or ART failure (HR = 6.26, 95% CI: 3.95 – 9.92, $P < 0.001$), and TB co-infection (HR

=1.98, 95% CI: 1.23 – 3.17; $P < 0.01$). Induction antifungal treatment with itraconazole was significantly associated with Tm death in univariable model (HR =1.86, 95% CI: 1.17 – 2.96; $P < 0.01$); however, it became insignificant in the multivariable model (HR =1.45, 95% CI: 0.9 – 2.32; $P = 0.12$).

Table 1. Risk Factors for 6-Month Talaromycosis-Associated Mortality

Risk factors	**Fatal**	**Alive**	**Univariate effect HR (95% CI)**	**Multivariate effect HR (95% CI)**
	(n = 76)	**(n = 362)**	***P* value**	***P* value**
Age, years (mean ± SD)	36 (± 7.1)	35 (± 7.4)	1.2 (0.9 – 1.59)	-
			$P = 0.22$	-
Male sex, n (%)	52 (68)	252 (70)	0.96 (0.59 – 1.56)	-
			$P = 0.87$	
Baseline CD4 counts, cells/μL (mean ± SD)	25 (± 53)	21 (± 46)	1.01 (0.97 – 1.05)	-
			$P = 0.52$	
Induction therapy with itraconazole (compared to amphotericin B), n (%)	48 (63)	166 (46)	1.86 (1.17 – 2.96)	1.45 (0.9 – 2.32)
			$P < 0.01$	$P = 0.12$
Not on ART or the first-line ART failure, n (%)	42 (55)	42 (12)	6.97 (4.43 – 11.0)	6.26 (3.95 – 9.92)
			$P < 0.001$	$P < 0.001$
Length of secondary itraconazole prophylaxis, months (mean ± SD)	5.2 (± 1.9)	5.4 (±1.7)	0.96 (0.85 – 1.08)	-
			$P = 0.45$	
Relapse, n (%)	6 (7.9)	12 (3.3)	2.0 (0.87 – 4.61)	-
			$P = 0.10$	
Tuberculosis co-infection, n (%)	27 (36)	59 (16)	2.46 (1.54 – 3.94)	1.98 (1.23 – 3.17)
			$P < 0.001$	$P < 0.01$

Summary statistics are mean (± SD) for continuous variables and frequency (%) for categorical variables; HR, hazard ratio; 95% CI, confidence interval

Risk Factors for Talaromycosis Relapse

Table 2 presents the univariable and multivariable Cox proportional hazard models to identify risk factors for disease relapse of patients with *T.marneffei* infection during 6 months of follow-up. The multivariable Cox proportional hazard analyses showed significant predictors of 6-month relapse from talaromycosis, including induction antifungal treatment with itraconazole compared to amphotericin B (HR = 6.58, 95% CI: 1.49 – 29.1, $P = 0.013$), absence of ART or ART failure (HR = 17, 95% CI: 5.97 – 48.2, $P < 0.001$). Longer duration of itraconazole secondary prophylaxis was a protective factor against Tm relapse (HR = 0.81, 95% CI: 0.67 – 0.98, $P = 0.03$).

Table 2. Risk Factors for Relapse from Talaromycosis

Risk factors	**Tm relapse (n = 18)**	**Non-Tm relapse (n=420)**	**Univariate effect HR (95% CI) *P* value**	**Multivariate effect HR (95% CI) *P* value**
Age, years (mean ± SD)	35 (± 7.9)	35 (± 7.4)	1.19 (0.66 – 2.13)	-
			P = 0.56	
Male sex, n (%)	15 (83)	289 (69)	2.27 (0.66 – 7.82)	-
			P = 0.20	
Baseline CD4 counts, cells/μL (mean ± SD)	14 (± 10)	22 (± 48)	0.89 (0.67 – 1.18)	-
			P = 0.42	
Induction therapy with itraconazole (compared to amphotericin B deoxycholate), n (%)	16 (89)	198 (47)	9.24 (2.12 – 40.2)	6.58 (1.49 – 29.1)
			P < 0.01	*P* = 0.013
Length of secondary itraconazole prophylaxis, months (mean ± SD)	4.5 (± 2.3)	5.4 (±1.7)	0.82 (0.68 – 0.99)	0.81 (0.67 – 0.98)
			P = 0.04	*P* = 0.03
Not on ART or the first-line ART failure, n (%)	13 (72)	71 (17)	18.9 (6.73 – 53.1)	17.0 (5.97 – 48.2)
			P < 0.001	*P* < 0.001
Tuberculosis co-infection, n (%)	6 (33)	80 (19)	2.44 (0.91 – 6.49)	-
			P = 0.08	

Summary statistics are mean (± SD) for continuous variables and frequency (%) for categorical variables. HR, hazard ratio and 95% confidence interval

Differentiation between Tm IRIS and Disease Relapse

Table 3 shows the clinical factors which can be used to differentiate Tm IRIS from Tm relapse. On the basis of my clinical knowledge, six routine laboratory tests were selected and used to distinguish both disease conditions. There were statistical differences between Tm relapse and Tm IRIS in the CD4 cell count ($P < 0.001$), haemoglobin level ($P = 0.004$), aspartate transaminase, AST ($P = 0.02$). More specifically, Tm IRIS patients had significantly higher levels of both CD4 cell count and haemoglobin, and normal value of AST compared to those with Tm relapse.

Table 3. Laboratory Features to Differentiate between Paradoxical Tm IRIS and Relapse

Factors	**Tm IRIS* (n = 23)**	**Relapse* (n = 18)**	***P* ****
CD4 cell count at IRIS/Relapse (cells/μL)	94 (50 - 123)	13 (6 - 30)	< 0.001
White blood cell count (x 10^3 cells/μL)	5.0 (4.4 - 8.3)	5.1 (3.2 - 9.2)	0.68
Haemoglobin level (g/dL)	11.2 (10.3 - 12.6)	8.7 (8.0 - 9.1)	0.004
Platelet cell count (x 10^3 cells/μL)	286 (232 - 341)	263 (40 - 343)	0.38
Aspartate aminotransferase (AST) (U/L)	39 (25 - 55)	169 (62 - 308)	0.02
Alanine aminotransferase (ALT) (U/L)	27 (22 - 44)	54 (25 - 134)	0.28

* Summary statistics is median (interquartile range). ** P values were withdrawn from Mann-Whiney-U tests

Discussion

To our knowledge, this is a large prospective cohort to characterize the long-term clinical outcomes of talaromycosis. Our study cohort originated from the previously published IVAP trial [8]. Participants were closely monitored by well-experienced medical staffs from study team. Our study showed that the 6-month mortality rate of mortality was 17.4% and that of relapse was 4.1%. Although the 30-day in-hospital mortality of talaromycosis patients was well reported, ranging from 10% to 30% with antifungal treatments [3-7, 13]. To date, there are still lacking prospective data for 6-month mortality as well as relapse. The identification of main predictors of 6-month clinical outcomes will aid to design prevention schemes in order to reduce the disease burden.

The major causes of deaths reported in IVAP participants were tuberculosis, disseminated talaromycosis, Tm relapse, ineffective Tm secondary prophylaxis and severe immunosuppression due to either not receiving ART or ART failure. My study clearly showed strong independent predictors of 6-month Tm mortality, including either absence of ART or ART failure (HR = 6.26, 95% CI: 3.95 – 9.92, $P < 0.001$). This places emphasis on restoration of patient's immunity with robustly effective ART as soon as possible after induction antifungal therapy for Tm patients. Notably, the most important concern for rapid ART initiation after disseminated TM infection is Tm IRIS; however, our published report demonstrated that patients with Tm IRIS had a favourable survival outcome [14]. On this account, I recommend commencing ART quickly after hospital discharge. Another critical issue is the increasing number of the first-line ART failure in the Vietnamese HIV-infected population and among cohorts in African countries [15-19]. The WHO has recommended that dolutegravir-based regimens should be the prioritized in all HIV populations [20], and Thanh NT et al. showed the good results from dolutegravir-based ART was effective in terms of rapidly increased CD4 counts and HIV viral suppression, fewer side effects, and improved patient's treatment adherence in the HIV outpatients in Vietnam [19]. Notably, previous studies have revealed that tuberculosis is the most common HIV co-infection with the prevalence of roughly 22 % among HIV-infected patients [3, 19, 21]. Again, in this study TB co-infection was the strong independent predictors of 6-month Tm mortality (HR =1.98, 95% CI: 1.23 – 3.17; $P < 0.01$). TB had closely two-fold of risk of 6-month death among Tm patients.

Talaromycosis relapse was frequently observed complication among Tm patients alongside with tuberculosis, which considerably accounted for main causes of Tm deaths during first six months after induction antifungal treatment [8]. On this account, identifying the significant predictors of Tm relapse will aid to figure out proactive interventions to prevent Tm relapse and to improve the quality of life of patients. This study shows that absence of ART or ART failure, induction fungal treatment with itraconazole compared to amphotericin B deoxycholate and length of itraconazole secondary prophylaxis were the significant independent predictors for 6-month Tm relapse. These results indicate that suboptimal fungicidal activity on *T.marneffei* fungal load oral itraconazole (compared to intravenous amphotericin B), shorter duration of secondary antifungal prophylactic treatment and patient's immune suppression (absence of ART and/or ineffective ART) are the main mechanisms for developing of disease relapse. Notably, tuberculosis is pathologically an important risk factor for Tm relapse; however, this study revealed no statistical association between tuberculosis and Tm relapse. Therefore, commencing ART quickly after hospital discharge and longer duration of itraconazole secondary prophylaxis are recommended to prevent disease relapse.

In clinical practice, clinicians will certainly encounter the challenging situation of how to distinguish between patients with Tm IRIS and those with Tm relapse with high concern about high mortality (33%) observed in Tm relapse [14]. Hence, it is important to distinguish these disease complications because the patients with relapse need prompt awareness and early management. My study shows that the routine laboratory tests including haemoglobin, platelet cell counts, liver transaminases and CD4 cell counts are of significance to differentiate Tm relapse from Tm IRIS. Notably, these routine blood tests are easily conducted and inexpensive. Our study has several limitations. Firstly, using a secondary dataset to perform a post-hoc analysis is considered a primary limitation. Secondly, there was a certain percentage of missing data due to patient loss to follow-up, regarding that these parameters were significant predictors of the final Tm mortality and relapse risk models.

Conclusion

This study highlights that antiretroviral therapy, antifungal induction and prophylaxis treatments, and tuberculosis co-infections were the main predictors for 6-month Tm fatality as well as relapse. The routine laboratory tests including full blood count, liver transaminase and CD4 count were of significance to distinguish disease relapse with Tm IRIS, considering the poor outcome of Tm relapse.

Conflicts of Interest

All authors declare no conflict of interest.

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The Impact of Promotional Pricing on Marketing Performance in the Nigerian Telecommunication Industry. A Study of MTN Enugu State Nigeria

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Abstract

The study aims to discover how promotional pricing affects marketing performance at MTN in Nigeria's Enugu State. Multiple linear regressions were employed to evaluate the hypotheses, and a quantitative research approach was used. An explanatory research approach was used to investigate and explain the effect of promotional pricing on marketing performance. The probability sampling method, which selects the sample using stratified randomization, was employed in this investigation. The sample size was calculated using the RAOSOFT sample size calculator, which suggested a sample size of 297. Factor analysis was then performed to test the validity of the numerous scale items that make up the subconstruct in the model. Kaiser-Meyer-Olkin (KMO) and Cronbach's alpha were used to test the data's sufficiency, appropriateness, and robustness. The SPSS 28.0 version was used to analyse the information gathered from respondents. The findings demonstrate that promotional pricing influences customer satisfactions, brand switching, and customer loyalty among MTN consumers in Enugu State, Nigeria. The outcomes further support the model's applicability and robustness in evaluating the correlations among the variables that are important to this investigation. It is advised that MTN in Nigeria's Enugu State take customer pleasure into account as a precondition for boosting customer loyalty through special pricing. The paper ends with a call for additional research to examine the model's applicability and robustness in a wide range of contexts and industries.

Keywords: *Customer brand switching, Customer loyalty, Customer satisfaction and promotional pricing.*

Introduction

Most businesses are expanding entities that want to turn a profit. Customer loyalty is essential to achieving this goal and is essential to the success of corporate organisations. Due to fierce rivalry from both domestic and foreign businesses, the telecommunications sector in Southeast Nigeria is very competitive. Many firms in the telecom sector have recently changed their attention from customer acquisition and retention to customer loyalty. Customer loyalty offers long-term economic benefits to businesses by strengthening existing customer relationships and enabling the acquisition of new consumers at a cheaper cost, which explains why participants in the telecoms sector are ready to implement it [1]. Promotional pricing has generated several advantages, such as increased market share and profitability as well as the capacity to create new revenue streams; increased buying activity; attracting new customers; creating a competitive edge; enhancing customer loyalty; and acting as a publicity tool for new products [2].

To the best of the researcher's knowledge, there aren't many studies that have looked at the study's topic. In the telecommunications sector, research has been done on sales promotion and how it affects customer loyalty; it has also been studied how brand identity affects customer

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loyalty and how sales promotion affects customer retention [3].

To the best of the researcher's knowledge, no research has been done in MTN Southeast Nigeria. Studies concentrating on promotional pricing and marketing effectiveness in the telecommunications business are still rare in the literature in the Nigerian environment. The current study examines the impact of promotional pricing on marketing performance in MTN in an effort to close these information gaps and add to the body of existing work, Enugu state Nigeria. Every business makes goals to keep customers and earn their loyalty. As a result, businesses use a variety of promotional tactics to attract new customers and keep hold of current ones. For instance, MTN has used a variety of promotional strategies in Nigeria, such as free midnight calls, airtime bonuses, and bonus data, as well as product strategy, pricing strategy, place and distribution strategy, promotional and advertising strategy, and service strategy.

Although it has been demonstrated that effective promotional pricing increases sales and offers chances for up- and cross-selling, it can also have negative effects if used incorrectly [3]. With relation to MTN Enugu in Nigeria, the main issue is the inefficient management and promotion of various network services and providers.

They have both internal and exterior issues. On the outside, MTN is up against competition from other network service providers who are all striving for a larger market share. The majority of MTN Nigeria's customers, who live in the vicinity, do not understand promotional messaging, which presents another communication difficulty, and are not always able to reach other branch offices. Promotional pricing is necessary to increase brand awareness and highlight the value of the brand by highlighting the brand and a variety of advantages for consumers who choose to purchase the brand.

To successfully accomplish this, the brand must be powerful and endowed with sufficient virtues to inspire customers to repurchase it after being convinced to do so by promotional price efforts. Price sensitivity, brand switching, and low rates of repeat purchases are issues with promotional pricing.

These challenges emphasize the need for focused study that looks at how both monetary and non-monetary marketing affect customer loyalty.

This study's main objective is to ascertain how promotional pricing affects consumer satisfaction, brand loyalty, and brand switching at MTN Enugu State in Nigeria. This study's primary goal is to examine how promotional pricing affects MTN's marketing performance in Nigeria's Enugu State.

Limitations

During this study, some difficulties occurred. Resources and the availability of pertinent materials strategic to the subject under study were the main causes of these constraints. It was more difficult than anticipated and took a lot of effort to obtain the various promotional price profiles for MTN Nigeria.

In addition to the aforementioned, it took longer than anticipated to obtain first-hand information from the respondents who made up the participant list. Due to the significant amount of MTN subscribers, the study was restricted to Enugu State, and as a result, the promotional pricing for MTN Nigeria was only measured there.

This alone is a limitation in terms of informing managers of marketing strategies that will affect all MTN subscribers countrywide. It would be ideal to conduct a country-wide survey to fully measure the promotional pricing of MTN Nigeria, as this will show a broader picture that will inform management on the best strategies to adopt.

The study was completed despite these obstacles, and its results were presented as impartially as feasible.

Review of Literature

Overview of the Telecommunication Industry

After the oil business, the telecom sector is reportedly Nigeria's most dynamic and competitive sector [5]. The telecom industry in Nigeria is extremely competitive, and telecom companies use a variety of sales and promotional techniques to try to attract and keep customers. With over one hundred seventy million (170) GSM customers and continued growth, Nigeria's telecommunications sector is one of the largest in Africa. It also has one of the highest fixed-line penetration rates and is expected to generate a billion dollars in overall revenue by 2022 [5]. There remain tremendous growth prospects in the Nigerian telecommunications industry, which has huge attraction for new entrants. For instance, Airtel (India's largest telecom company) acquired Zain, Nigeria's third-largest mobile telecom operator, in 2010. Etisalat entered the Nigerian telecom industry in January 2007. The transactions displayed above demonstrate the Nigerian telecom market's level of attractiveness. In Nigeria, the telecom sector supported around 8,000 direct first-tier jobs (vendors, PR firms, operators' call centre agents, security, etc.) and an estimated thirty (30) million indirect second-tier jobs [5]. Today, there are twelve telecommunications companies operating in the Nigerian market, which are: MTN Nigeria, 9 Mobile, Globacom, Airtel Nigeria, Smile Nigeria, Main One, Spectra Net, Swift Network Limited, NTEL, L. M. Ericsson Nigeria LTD, Netcom Nigeria Limited, as well as We Konnect, which provides both GSM and mobile fixed wireless services. To compete successfully in this environment, telecommunications operators have developed promotion strategies that include airtime bonuses, reductions in airtime rates, free SMS, free credit, and small top-ups, among others. The main aim of these strategies was not only to beat the competition and retain customers but also to attract new customers by offering attractive packages. The study area is MTN Enugu state Nigeria.

Promotion

According to [6], promotion is a process by which businesses interact with their target audiences to inform, direct, remind, update, persuade, and encourage consumers to adopt, buy, and consume their offerings. This is done by implementing creative campaigns using personal selling, direct marketing, advertising, sales promotion, public relations, and word-of-mouth communication. The use of promotion as a marketing tool helps suppliers and buyers communicate with one another. By doing this, the vendor seeks to persuade and influence customers to purchase their goods or services. It helps to inform people about the good, the service, or the business [6].

Sales Promotion

The word “sales promotion” refers to “short-term incentives that are offered to the ultimate customers to encourage them to make an immediate purchase of the product or service.” Sales promotion is described as “those marketing activities, other than personal selling, advertising, and publicity, that stimulate consumer purchasing and other dealer effectiveness measures, such as displays, shows, expositions, demonstrations, and various other nonroutine” ongoing sales efforts not in routine. The term “sales promotion” may also refer to all marketing and promotional efforts that, aside from advertising, personal selling, and publicity, aim to entice and persuade consumers to make purchases using incentives including discounts, rebates, displays, and demonstrations [7].

Promotional Pricing

Promotional pricing can be used to persuade current consumers to switch brands in favor of a new one or to lure new customers who have never used the product to use it. Additionally, it may have an impact on the brands, volumes, and consumption rates of consumers. Customers may purchase more goods when there are

discounts since they have more money to spend. Sales have increased because of increased product perceived value and the cost savings that result from lower product costs. Additionally, because the specials are only available for a short time, customers are under pressure to buy the products immediately [8].

Customer Satisfaction

When customers' pre-consumption expectations of a good or service meet or surpass their actual consumption experience, they are said to be in a satisfied state of mind. Customer satisfaction is the overall percentage of customers who use a specific product and are pleased and satisfied with it. Customer satisfaction is subjective because only those who use or consume a product can gauge their level of satisfaction with it. It is made up of a customer's views, assessments, and psychological responses to their experience with a product or service. [9]. One of the strongest drivers of customer loyalty is customer pleasure. The perception that a product has met or is beyond a customer's expectations is known as customer satisfaction [9].

Customer Loyalty

The meaning of "customer loyalty" describes a consumer's dedication to a good or service. By delivering high-quality services and offers during different buy professions, customer loyalty can be increased in the consumer's mind [10]. For instance, a coupon for free airtime after buying five airtimes, a cash discount offer, and such initiatives will entice customers to stick around. Iglesias adds that "the customer's willingness to develop a long-term relationship with a specific brand and recommend such a brand to other people [11]" is another definition of customer loyalty. A consumer's strong attachment to and fondness for a company's goods and services is known as customer loyalty. Customer loyalty can also be characterized as a steadfast will to continue using a company's goods and services despite potential deterrents from rivals. A "loyal customer" is defined in the context of this study as a subscriber to a mobile telecommunications company in Nigeria who tends to stick with such a company even in the face of ongoing competitive offerings in the form of discounts, free airtime, bonuses, advertisements, and other promotional offerings from rival mobile telecommunication companies. Customer loyalty is described as the determination to repeatedly make purchases of a preferred good or service, despite external circumstances and marketing initiatives that would encourage switching behavior [9].

Customer Brand Switching

consumer brand switching is the act of a consumer leaving his or her regular service provider and switching to another, typically because of unhappiness or other issues [10]. In the telecom sector, brand switching by customers can be either partial or complete. This implies that a consumer has the option to temporarily cancel their subscription to a particular network provider or to completely cease utilizing their services [12]. Brand switching can occur for any product. Brand switching is a customer switching from one brand in the same category to another. It is also a condition when a consumer moves his brand loyalty to other brands and even ends up using the previous brand. One of the considerations among customers for switching brands is switching cost. which can be a barrier for customers to switch brands. Switching costs can be defined as psychological.

Development of Research Hypothesis

The Connection between Promotional Pricing and Customer Satisfaction

When the financial advantages outweigh the cost to the customer, there is increased customer satisfaction. To determine customer happiness and brand loyalty, price is therefore crucial. Customer satisfaction can go up with promotions [13]. Customers who are pleased with the information they have gotten are more likely to

recommend certain service providers. Customer loyalty will rise in direct proportion to customer satisfaction, which is increased by promotional activity. Customer loyalty is positively and significantly impacted by promotional pricing. There is a connection between promotional prices and consumer satisfaction. Therefore, It is hypothesized that:

H_1: *Promotional pricing has* a significant positive influence *on customer satisfaction.*

The Connection between Promotional Pricing and Customer Brand Switching

Promotional pricing plays a major role in influencing customers toward brand switching. Companies focus on the promotional pricing offers of their competitors. The switch in brand is directly linked to the promotional pricing. Promotional pricing for one brand has a direct effect on the other brand. Customers are continuously attracted by promotional pricing. Moreover, companies observe their competitors' promotional activities and take corrective action to retain customers and prevent them from switching brands. A study by Nagadeepa, Selvi and Pushpa suggests that promotional pricing is more likely to induce consumers to switch brands andto attract loyal customers of that brand. Promotional pricing such as competitions, price discounts, coupons as well as free samples had the greatest effect on influencing consumers to switch brands. If the telecom company charges low prices and provides good services, then switching to others will be reduced, and the customer will be more satisfied. When low prices are charged, more customers are moved toward satisfaction [14]. Therefore, it is hypothesized that:

H_2: *Promotional pricing has* a significant positive influence *on customer brand switching.*

The Connection between Customer Loyalty and Satisfaction

Customer loyalty is influenced by customer satisfaction, and loyal customers are those who are satisfied. In the setting of a supermarket, customer happiness statistically significantly affects customer loyalty [15]. Customer satisfaction is a gauge of how well a company's product or service addresses customers' demands overall. The outcome of the evaluation that customers anticipate from the purchase of a product is customer satisfaction. A mindset called customer satisfaction combines satisfaction with the quality of a good or service. Additionally, customer satisfaction is crucial for businesses to assess the quality of services offered because it predicts how loyal a customer will be to a service. Customer loyalty relates to how businesses sustain and retain customers, so they continue to use their goods or services, and goes beyond just pleasing customers. Therefore, it is hypothesized that:

H_3: *Customer satisfaction has* a significant positive influence *on customer loyalty.*

The Connection between Customer Satisfaction and Customer Brand Switching

Low brand switching among consumers is a result of high customer satisfaction. Customers who are happy with their purchases are more inclined to recommend the product to others and may stay with that brand. The majority of the time, satisfaction is viewed as the main consideration. Dissatisfied customers might have a greater impact on a company's revenues than satisfied customers because they are more inclined to look for what they are looking for in services offered by other rivals [9]. Customer satisfaction is crucial to a business's performance and profitability [9]. One of the key elements that influence brand switching is customer happiness, which is multidimensional to be more explicit, it pertains to all services offered by service providers; as a result, a lack of satisfaction in one aspect of the business may result in a loss of contentment with the entire service, which may result in brand switching. Accordingly, the fourth hypothesis of the study is developed as follows:

H_4: *Customer satisfaction has* a significant positive influence *on customer brand switching.*

The Connection between Customer Brand Switching and Customer Loyalty

Brand switching refers to the potential for a consumer to shift their current transactions with one brand to a rival [16]. Consumers typically stick with the same brand because they grow accustomed to it, feel emotionally connected to it, or do so because switching would be expensive. On the other hand, they also switch to other brands out of boredom, dissatisfaction, or disidentification with the current brand, or because of the product advantage, lower price, preferential policies, or conveniences of other brands [17]. Brand switching influences a person's loyalty because barriers to customers' feelings are tied to psychological, social, functional, and ritual variables in addition to economic values. In addition, brand trust is also an affective bond between customers and the brand, and customers rely on and love to use the current brand. Therefore, it is hypothesized that:

H_5: *Customer brand switching has* a significant positive influence *on customer loyalty among*

The Connection between Promotional Pricing and Customer Loyalty

According to research by [18], promotions can increase customer happiness. Customers are more likely to remain loyal and refer to service providers if they are happy with the information they have received. As a result, promotions and customer loyalty are related. Pricing promotions may improve customer loyalty. Sales promotions have a beneficial influence on brand loyalty, according to research on how they affect consumer-based brand equity. According to the findings, non-monetary promotions are more successful in fostering customer loyalty (brand loyalty) because they strengthen more positive associations than monetary ones. Sales promotions can be used to increase customer loyalty based on the outcomes. Therefore, it is hypothesized that:

H_6: *Promotional pricing has* a significant positive influence *on customer loyalty.*

Empirical Evidence

[19] assessed how the Honda Dealer "Banyuwangi Motor's price, promotion, and service quality affected consumer satisfaction and loyalty. All 8348 consumers of the Honda Dealer "Banyuwangi Motor" in the years 2019–2020 comprised the study's population. Purposive sampling was used to choose the sample from 100 customers under the condition that they had purchased a Honda motorbike from the Banyuwangi Motor Dealer twice. The questionnaire utilised underwent the reliability test and validity test to ensure its reliability and validity. The inference made in this study's hypothesis was tested using SEM-PLS analysis. The analysis of the study's findings using Warp PLS 7.0 revealed that the price variable had no discernible impact on customer loyalty and pleasure. Promotion has a big impact on consumer loyalty and satisfaction. Customer loyalty and satisfaction are highly impacted by service quality. Customer loyalty is significantly impacted by customer satisfaction [19].

[20] investigated the impact of advertising and sales promotion on marketing performance in Nigeria. The investigation of the importance of advertising and sales promotion in Nigeria is the major goal of this study. Simple random sampling was used as the sampling technique, and survey research as the research design. The hypothesis is tested using the chi-square method using the structured questionnaire's five-point Likert scale replies.

The results show that sales promotion and publicity are effective instruments for accomplishing organisational marketing objectives in a cutthroat marketing environment. Publicity and sales promotion should be effectively used to increase consumer demand and improve organisational reputation without

compromising product quality or performance [20].

[9] investigated how Botswana's Sefalana Holdings' marketing performance was affected by after-sales services. The study's objective was to determine how Sefalana Holdings in Botswana's after-sales services affected customer satisfaction, loyalty, and retention. According to the study's findings, Sefalana offers after-sales services, but they are not effectively utilised and executed. According to the study's findings, Sefalana Holdings in Botswana has a weaker significant positive link between after-sales services and customer happiness, loyalty, and retention. This implies that Sefalana after-sales services are not performed correctly.

Research Methodology

The present study adopts a positive perspective. The researcher is using positivism because it enables the researcher to cover current definitions, and a wide range of situations in a short period of time, to get an overview of society, and uncover social trends. The research design that was used in this study is quantitative. A quantitative strategy is chosen to allow the researcher to test for the impact of promotional pricing on marketing performance in MTN Enugu, Nigeria. Due to its greater scientific rigour, objectivity, speed, concentration, focus, affordability, usability, and acceptability, quantitative research is preferable to qualitative research. In order to study and explain the effect of promotional pricing on marketing performance and the degree of relationship between the independent and dependent variables in MTN, an explanatory research approach that works hand in glove with a cross-sectional approach was chosen. It is used because is easy to use and is just for a particular period. The population of this study include all MTN individual customers in Enugu State, south-eastern Nigeria. Probability sampling is the sampling technique that was employed in the present research**.** It was used because the population is large, the study is statistical, and quantitative, and the questionnaire is closed-ended.

The sampling that was used is stratified random sampling because it is more organized, minimizes sample selection bias, captures key population characteristics in the sample, and provides accurate information. The sampling frame for MTN subscribers is known by the researcher. In this study, the RAOSOFT sample size calculator was used to determine the sample size. RAOSOFT Interform is a cutting-edge tool for creating web surveys and forms that enables you to construct huge web surveys with enormous populations and/or large question sets, as well as complicated questionnaires requiring extended logic statements. Data collection was done using a questionnaire.

Results and Discussion

Psychometric Properties (Reliability and Validity)

Exploratory factor analysis was performed on the 36-item scale used to measure customer loyalty. Factor analysis was employed using principal component analysis (PCA) with a Varimax rotation and variables with a factor loading of 0.5 and above were included in the analysis. The threshold on PCA according to [20] is 0.5 Factors with Eigen values greater than 1.00 were used. Table 2 shows all the four factors, (Promotional Pricing, Customer satisfaction, Customer Brand switching, and Customer Loyalty).

Table 2. Psychometric Properties of the Scale Items

Cronbach Alpha/Internal Consistency	**KMO (Kaiser Meyer Olkin)**	**Bartlett Test of Sphericity**	**Factor Metrics/ Communalities**	**AVE (Average Variance Extraction)**	**Mean**	**Standard Deviation**
Promotional Pricing (0.949)	0.948	2201.691	-	68.636	-	-
			.628		3.32	1.181
			.643		3.36	1.099
			.691		3.27	1.135
			.709		3.20	1.144
			.732		3.34	1.162
			.618		3.24	1.181
			.703		3.26	1.173
			.762		3.22	1.193
			.658		3.25	1.129
			.718		3.27	1.176
Customer Satisfaction (0.957)	.949	2195.96	-	74.272	-	-
			.658		3.33	1.149
			.733		3.27	1.166
			.752		3.28	1.122
			.790		3.30	1.162
			.777		3.19	1.153
			.786		3.24	1.153
			.771		3.25	1.139
			.702		3.25	1.149
			.714		3.28	1.193
Customer Brand Switching (0.916)	.914	1237.31	-	63.110	-	-
			.754		3.15	1.205
			.796		3.21	1.193
			.829		3.11	1.176
			.816		3.13	1.187
			.735		3.17	1.145
			.840		3.11	1.125
			.770		3.28	1.079
			.810		3.20	1.198
Customer Loyalty (0.955)	.924	2094.36	-	73.812	-	-
			.807		3.40	1.197
			.884		3.35	1.128
			.884		3.24	1.187
			.834		3.14	1.177
			.837		3.20	1.206
			.871		3.15	1.171
			.891		3.01	1.181
			.871		3.23	1.102
			.850		3.28	1.164

Table 2 was used to measure promotional pricing, customer satisfaction, customer brand switching as well as customer loyalty. The Cronbach's alpha for promotional pricing is 0.949. Cronbach's Alpha of 0.957 depicts a very high level of consistency on customer satisfaction. The Cronbach's alpha for customer brand switching is 0.916. The Cronbach's alpha for customer loyalty is 0.955. The minimum threshold of Cronbach's alpha (internal consistency) according to [21] is 0.7; the scale item in this study is greater than 0.7; all Cronbach's alpha and composite reliability coefficients were greater than 0.7; this shows that the questions that were asked in promotional pricing are of internal consistency and have met the minimum threshold stated in the extant literature. The mean value of 5 on the Likert scale was used. According to [20] the mean value is greater than 3The mean value of promotional pricing in this study is greater than halve; halve is 2.5. The mean value of promotional pricing scale items is over 3 on the Likert scale, which means most of the respondents agree that MTN offers attractive promotional offers to customers. The mean values of the scale items further indicate meaningful contributions in explaining the subconstruct dynamics.

For Average Variance Extraction values were larger than Fornell and Larcker's recommended minimum point of 0.5. The scale item for promotional pricing accounts for 68.636 variations in explaining promotional pricing. All AVEs were larger than their corresponding inter-construct correlations. The Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Sphericity (2201.691) of promotional pricing, (2195.96) of customer satisfaction, (2094.36) of customer loyalty and, (1237.31) of customer brand switching also confirm the validity of the construct scale items and meet the minimum threshold as explicated in extant literature. In extant literature, the minimum threshold for KMO is 0.5 and above, and in this study, KMO is above 0.5. Kaisen recommends 0.5 as the minimum (barely accepted), values between 0.7 and 0.8 are acceptable, and values above 0.9 are superb [20]. In addition, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) is above 0.80 in all, which means this study shows the robustness of its validity with regards to promotional pricing and values.

The factor metrics and communalities should be 0.5 and above according to [20], which means all the findings in this study are greater than 0.5. The communality range for the construct scale items also validates that the psychometric nomenclature of scale items in Table 2 is robust in this study. The sample size is adequate for this quantitative study, and the analysis should proceed.

It is evident from these results in promotional pricing, customer satisfaction and customer brand switching that conditions for convergent validity have been satisfied [21].

Inferential Statistics

Table 3. Results of Correlation Analysis among the Key Variables

Correlations (Pearson)					
		Promotional pricing	Customer satisfaction	Customer brand switching	Customer loyalty
Promotional pricing	Pearson Correlation	1	.892**	.789**	.818**
	Sig. (2-tailed)		<.001	<.001	<.001
	N	273	254	246	240
Customer satisfaction	Pearson Correlation	.892**	1	.819**	.842**
	Sig. (2-tailed)	<.001		<.001	<.001
	N	254	261	243	233

Customer brand switching	Pearson Correlation	.789**	.819**	1	.832**
	Sig. (2-tailed)	<.001	<.001		<.001
	N	246	243	254	232
Customer loyalty	Pearson Correlation	.818**	.842**	.832**	1
	Sig. (2-tailed)	<.001	<.001	<.001	
	N	240	233	232	244
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 3 shows that all the variables are correlated with each other. Investigating the effect of promotional pricing on marketing performance in Mobile Telephone Network (MTN), Enugu State, Nigeria, is the primary goal of this study.

Specifically, the study measures the relationship between promotional pricing and customer loyalty among MTN customers in Enugu State, Nigeria, as well as the relationship between promotional pricing and customer satisfaction among MTN customers in Enugu State, Nigeria. It also examines whether promotional pricing influences customers' switching between brands. At a tailed level P value of less than 0.01 indicates a significant correlation.

H1: Promotional Pricing/Customer Satisfaction Supported(r=0.892) Significant at P-value <0.01 Using Pearson Correlation

H1 is supported since it is clear from the current study that promotional pricing has a significant positive influence on consumer satisfaction, which indicates that the methods of promotional pricing will ultimately boost customer contentment.

This is in line with research findings from [23] that indicated the significant impact that promotional pricing had on consumer satisfaction. Additionally, research by Asif found that offering discounts increases customer satisfaction. Promotional pricing can increase customer satisfaction and confidence. Customer satisfaction has a good and significant association with promotional prices, which also greatly influences it [24]. Contrary to what [25] found, promotional pricing had a large negative impact on consumer satisfaction and no discernible beneficial impact.

H2: Promotional Pricing/Customer Brand Switching Supported (r=0.789) Significant at p<0.01 Using Pearson Correlation

Promotional pricing has a significant positive influence on customer brand switching; thus, H_2 is supported. The result agrees with [26] that there is a significant positive relationship between promotional pricing and customer brand switching.

This corroborates Umair's observation that promotional pricing directly influences consumer brand switching. If the telecom company charges low prices and provides good services, then switching to others will be reduced, and the customer will be more satisfied. When low prices are charged, more customers are moved toward satisfaction [26]. This is contrary to [27] finding that promotional pricing had no significant influence on brand switching. Also, sales promotional activities have no significant positive influence on brand switching.

H3: Customer Loyalty/Customer Satisfaction Supported (r=0.842) Significant at p<0.01 Using Pearson Correlation

Customer loyalty has a positive significant influence on customer satisfaction, suggesting that H_3 is supported. This study also established that customer loyalty is significantly and positively related to customer satisfaction, thus lending support to H_3. [19] confirmed in his

study that customer satisfaction has a positive and significant effect on customer loyalty, the more satisfied customers are with the brand, the more loyal they become. Customer satisfaction proved to influence customer loyalty significantly [19]. It signified that, when customer satisfaction increased, customer loyalty would increase, On the contrary, dissatisfaction with promotions decreases loyalty toward customers. However, these study findings differ from the findings of some other scholars that customer satisfaction alone does not guarantee loyalty because, in some instances, satisfied customers have been found to defect to competitors, as postulated in the literature [28]. Customer satisfaction has no significant effect on customer loyalty [28].

H4: Customer Satisfaction/Customer Brand Switching Supported (r=0.819) Significant at p<0.01) Using Pearson Correlation

Customer satisfaction has a positive significant influence on customer brand switching, implying that H_4 is supported. When the customers are satisfied, they will not be bothered to switch from MTN to another network. Customer satisfaction is a result of how well or poorly the customer experiences the purchase process. This study demonstrated that consumer satisfaction significantly influenced brand switching, which is in line with Liang's finding that consumer satisfaction simply reduces brand switching. Also, customer satisfaction has a positive significant influence on customer brand switching. it was concluded that brand switching has a positive and direct effect on customer satisfaction. The possibility of the customer switching depends on customer satisfaction as it relates to the product. Thus, customer satisfaction is considered a positive determinant of how strong the relationship between the customer and the product provider is. Is totally different from [25] traditional view that consumer satisfaction facilitates brand switching, the effect of consumer satisfaction on brand switching was not positively significant. Customer satisfaction has a negative influence on brand switching.

H5: Customer Brand Switching/Customer Loyalty Supported (r=0.832) Significant at p<0.01) Using Pearson Correlation

The results of this study also established and note that customer brand switching has a significant effect and positively related to customer loyalty, thus lending support to H_5. This finding reflects that telecommunications companies offered superior customer service, which resulted in customer loyalty. This is in line with the postulation expressed by [29] which states that brand switching affects a person's loyalty because the barriers to customers feelings are not only based on consideration of economic values but also related to psychological, social, functional, and ritual factors. According to [29] it was concluded that brand switching has a positive and direct effect on customer loyalty. Also, brand switching costs have a positive impact on customer loyalty. However, this result is opposite from the research conducted by [27] which proved that trust has a diminishing effect on the relationship between switching barriers and customer loyalty. So, it could be concluded that brand switching has a significant effect on customer loyalty at MTN. Brand switching has a significant negative effect on customer loyalty and customer loyalty does not have a significant impact on brand switching [27].

H6: Promotional Pricing/Customer Loyalty Supported (r=0.818) Significant at p<0.01 Using Pearson Correlation

resulting that H6 is supported, which suggests that methods of promotional pricing would eventually boost customer loyalty, it is clear from the current study that promotional pricing has a positive significant influence on customer loyalty. The results of this study are in line with those of earlier studies, which discovered that

promotional pricing increases customer loyalty. Additionally, they discovered that customers' purchasing decisions are easily influenced by promotional pricing in their study on the influence of sales promotions on consumer purchasing behavior. Promotional pricing has a positive and significant effect on customer loyalty. These findings are consistent with research findings from [3] and [30], who conducted a study to quantify the relationship between promotional pricing and brand loyalty and discovered a favourable correlation between the two. Promotional pricing is a tactic used by businesses to draw customers to their products and services while also retaining their loyalty. Promotional pricing is a crucial tactic for boosting customer and brand loyalty. Customers will become more devoted to the brand and be more likely to make repeat purchases and recommend it to others if there are discounts targeted directly towards MTN. This is supported by research findings from [31], which demonstrate that promotional pricing has a favorable, considerable impact on customer loyalty. These study results, however, differ from those of certain other researchers, such as [1], who hold that promotional pricing has a small, unimportant impact and independently predicts consumer loyalty. In his investigation of the relationship between promotional pricing and customer loyalty, [1] discovered that promotional pricing has a bad impact on loyalty because it sends the wrong message to customers who mistakenly believe that lower costs equal inferior products. Promotional pricing has no discernible impact on consumer loyalty, according to [28].

Regression Coefficient

Table 4. Regression Coefficient for Satisfaction, Brand Switching, Loyalty, and Promotional Pricing

Regression (Coefficients)												
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	Variance Inflation factor
1	(Constant)	2.915	1.017	-	2.867	.005	.911	4.919	-	-	-	-	-
	Customer satisfaction	.711	.063	.658	11.297	<.001	.587	.835	.895	.610	.327	.247	4.054
	Customer brand switching	.102	.076	.079	1.355	.177	-.047	.251	.794	.092	.039	.244	4.091
	Customer loyalty	.219	.065	.205	3.343	<.001	.090	.348	.824	.222	.097	.223	4.478
a. Dependent Variable: Promotional pricing													

Another analysis made was a regression coefficients analysis. The analysis was made to evaluate whether customer loyalty, customer satisfaction and customer brand switching, that were measured in the experiment, had any significant effect on promotional pricing. The regression analysis was made using promotional pricing as the dependent variable, and customer loyalty, customer satisfaction and customer brand switching as the constant or, in other words, independent variables. The findings show that promotional pricing has a positive relationship with customer loyalty, customer satisfaction, and customer brand switching. This means that promotional pricing positively promotes customer loyalty, customer satisfaction, and customer brand switching among MTN users in Enugu State, Nigeria.

1. The beta coefficient H1 (β = 0.658, t = 11.297) is supported in this empirical study. It means customer satisfaction explains the variation in promotional pricing to the extent of 65.8%. This means that when MTN subscribers are satisfied with respect to customer satisfaction, the beta coefficient is very strong in explaining promotional pricing. This confirms [23] assertion in Bandung that there is a nomological relationship between promotional pricing and customer satisfaction. Promotional pricing can provide satisfaction to consumers. Based on the results of testing and data analysis by [23], the results showed that promotional pricing has a significant relationship with customer satisfaction.
2. The standardized beta coefficient H2 (β =079, t = 1.355) is supported in this empirical study. This confirms Umair's observation that there is a nomological relationship between promotional pricing and customer satisfaction. If the telecom company charges low prices and provides good services, then switching to others will be reduced, and the customer will be more satisfied.
3. The standardized beta coefficient H6: (β = 0.205, t 3.343) is supported in this empirical study. This also confirms [3] assertion that there is a nomological relationship between promotional pricing and customer loyalty.
4. Collinearity is a potential threat to studies that test cause-and-effect relationships, such as this study. The multicollinearity assumption is not violated in this study. This is because the tolerance level for the hypothetical relationships is less than 1 (0.247, 0.244, 0.223). While the VIF Variance Inflation Factor must be 1 or greater than 1 (4.054, 4.091, and 4.478). Multicollinearity did not pose a threat to this study [32, 33]. [32] suggests that a small tolerance of (<0.10) and a large variance inflation factor (> 10) indicate the presence of collinearity.
5. Linear relationships exist between the myriad of constructs in the structural model (promotional pricing, customer satisfaction, customer brand switching, and customer loyalty) as the F-values for the respective linear models are above the F-values of other models considered. Multicollinearity assumptions were also not violated, as tolerance values are less than 1 and variance inflation factors (VIFs) are greater than 1, as postulated in the extant literature.

Table 5. Analysis of Variance (ANOVA)

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17135.294	3	5711.765	326.963	<.001[b]
	Residual	3755.865	215	17.469	-	-
	Total	20891.160	218	-	-	-

a. Dependent Variable: PPT
b. Predictors: (Constant), customer loyalty, customer satisfaction, customer brand switching.

The independent variables (customer loyalty, customer satisfaction, and customer brand switching) are significant in explaining promotional pricing among MTN subscribers in Enugu State, Nigeria. There is a relationship between these independent variables. An organization that is service-oriented, like MTN, will be able to retain their staff, establish consolidated promotional pricing, establish a unique selling proposition, and establish niche, differentiation, and uniqueness. Customer loyalty is increased in direct proportion with customer satisfaction. Customers that are loyal have a favourable attitude towards a brand and are keen to continue using it both currently and in the future. Customer loyalty can therefore lower operating expenses based on declining customer satisfaction as well as marketing failure costs. Customer loyalty was strongly influenced by both customer satisfaction and switching costs. At the heart of marketing is customer satisfaction. Consumers respond to switching expenses. positive Switching expenses increase both loyalty and the need for retribution. Customer happiness is crucial to a business's success and profitability. It has a significant role in determining revenue and earnings and is regarded as one of the company's assets. The performance of the product, which is connected to the tangible components that comprise the product, can be used to gauge customer satisfaction in the product sector. Cost, services, and the price the customer must pay to move brands are the variables that cause consumers to change brands. Etc. Cost and pricing are the most crucial variables since they affect customers' brand switching. Low costs and outstanding service from the telecom provider would discourage customers from switching to rival providers, increasing satisfaction, and boosting customer loyalty.

Table 6. Nomological Web

Model Summary[d]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
3	.888[c]	.788	.785	4.24547	.011	11.179	1	215	<.001	1.800
c. Predictors: (Constant), customer brand witching, customer satisfaction, promotional pricing										
d. Dependent Variable: Customer loyalty										

H3 and H5 are supported. Customer brand switching, customer satisfaction, and promotional pricing account for 78.5% of the variation in explaining customer loyalty among MTN subscribers. The Durbin-Watson also corroborates the assertion espoused apriori.

Adjusted R Square (Adjusted Root Mean Square Error of Approximation/RMSEA) = 78.5% [32, 33], which means the independent variables account for 78.5% of the variation in customer loyalty. Customer satisfaction, customer brand switching, and promotional pricing have a significant effect on customer loyalty among MTN users in Enugu State, Nigeria. Therefore, hypotheses H3 and H5 are supported in this empirical study. Durbin Watson needs to be greater than 1 to explicate the significant effect of the independent variables on the dependent variable [34]. Here, Durbin-Watson is 1.800. This value of Durbin Watson's collaborates with the assertion that is stated above of 81.8 variation, which means the

independent variables have a significant effect in explaining customer loyalty. Therefore, hypotheses H3 and H5 are supported in this empirical study.

The findings show that customer loyalty has a positive relationship with customer satisfaction, customer brand switching, and promotional pricing. This means that customer loyalty positively promotes customer satisfaction, customer brand switching, and promotional pricing among MTN users in Enugu State, Nigeria.

Table 7. Measures for Goodness of Fit (Measurement Model Assessment)

CMIN	DF	P	CMIN/DF	NFI	RFI	IFI	TLI	CFI	RMSEA
368.15	136	0.00	2.71	0.89	0.92	0.91	0.93	0.95	0.048

CMIN: Contrast Media Induced Nephropathy, NFI: Normed Fit Index, RFI: Relative fit Index, IFI: Incremental Fit Index, TLI: Tucker Lewis Index, CFI: Comparative Fit Index

AMOS 23.0 was used to assess the structural and measurement models. On the basis of the parsimonious model of promotional pricing metrics, customer loyalty, customer brand switching, and customer satisfaction, confirmatory factor analysis (CFA) was performed on the 36 items using Amos 23.0. to clarify the five-construct model's psychometric nomenclature (Table 7). In addition, the model was defined and modified using modification indices that were calculated to explain the model fit. According to [32], the goodness-of-fit measures are within the predetermined threshold. According to the existing literature, the root mean square error of approximation (RMSEA) is less than 0.08 and the goodness of model fit is all over the cutoff of 0.9. Furthermore, a good model fit is explained by the various goodness-of-fit measures. [32] All goodness of fit metrics is within the threshold, as shown in Table 7's explanation of the measurement model's results. The normed chi square (X2/df), NFI, RFI, IFI, TLI, and CFI all above the 0.9 cutoff, while the RMSEA is less than 0.08. All of them satisfy the minimal requirement of 0.9 as stated in the available literature [32]. The root mean square error of approximation (RMSEA) is less than the 0.08 cutoff set forth in the body of existing literature [32].

Table 8. Measures for Goodness of Fit (Structural Model Assessment)

CMIN	DF	P	CMIN/DF	NFI	RFI	IFI	TLI	CFI	RMSEA
432.11	123	0.00	3.51	0.92	0.89	0.97	0.93	0.95	0.051

To gain a broader understanding of the model's alignment with the data in the model, the structural dynamics of the model were assessed in the context of the goodness of fit measures with respect to measurement model. It was crucial to assess the structural qualities of the model after the psychometric properties had been assessed and subliminal assumptions had been looked at. The normed chi-square (c2 /df), which slightly surpasses the value of three, is the only goodness-of-fit metric for the measurement model that does not fall inside the parameters set by [32]. The NFI, RFI, IFI, TLI, and CFI goodness-of-fit metrics in Table 8 are all over the cutoff of 0.93, and the RMSEA is below a value of 0.08, indicating the goodness of fit as proposed in extant literature by [32], as shown in Table 8. It was discovered that the assumptions were supported regarding the linkages that were postulated for the study (Table 8). Validity is assured by taking these findings into account.

Table 9. Summary of the Findings

Hypotheses	Hypothesized Metrics	Outcome
H_1: Promotional pricing/Customer satisfaction	Promotional pricing has a significant positive influence on customer satisfaction	Supported
H2: Promotional pricing/Customer brand switching	Promotional pricing has a significant positive influence on customer brand switching	Supported
H3: Customer satisfaction/Customer loyalty	Customer satisfaction has a significant positive influence on customer loyalty	Supported
H4: Customer satisfaction/Customer brand switching	Customer satisfaction has a significant positive influence on customer brand switching	Supported
H5: Customer brand switching/Customer loyalty	Customer brand switching has a significant positive influence on customer loyalty	Supported
H6: Promotional pricing/Customer loyalty	Promotional pricing has a significant positive influence on customer loyalty	Supported

Conclusion

Regarding the relationship between promotional pricing and marketing performance among MTN customers in Enugu State, Nigeria, this study presents unique results. In any telecoms company, especially in a highly competitive market, developing and sustaining positive customer relationships and gaining customer loyalty are crucial. Based on the outcomes of tests conducted on each of the hypotheses put out in this study, the following conclusion can be made:

1. According to the test's findings, promotional pricing significantly improves customer satisfaction among MTN subscribers in Enugu State, Nigeria. Pricing during promotions reflects what the customer would expect.
2. The test results prove that promotional pricing has a significant positive influence on customer brand switching among MTN customers in Enugu State, Nigeria. This means that promotional pricing has a positive effect on customer brand switching.
3. The test results demonstrate that customer loyalty among MTN customers in Enugu State, Nigeria, is significantly positively influenced by customer satisfaction. This implies that consumer loyalty may be impacted by customer satisfaction.
4. The test results demonstrate that customer satisfaction among MTN subscribers in Enugu State, Nigeria, has a considerable beneficial impact on brand switching. This implies that brand switching can be influenced by customer satisfaction.
5. The test results demonstrate that brand switching among MTN consumers in Enugu State, Nigeria, significantly influences customer loyalty. This implies that brand switching by consumers can have an impact on their loyalty.
6. The study's findings demonstrate that promotional pricing increases customer loyalty among MTN customers in Enugu State, Nigeria. Therefore, promotional pricing may have an impact on customer loyalty.

Managerial Implications

The Nigerian mobile telecommunications industry has witnessed unprecedented expansion in the last ten years, with several new entrants (National Communication Commission, 2023). Therefore, it is imperative for companies to attract and retain consumers to remain competitive, profitable, and ultimately sustainable. This seemingly arduous task requires cutting edge technology, innovation, and creative thinking to accomplish. Accordingly, it is very instructive and important for brand managers to have in-depth understanding of customer behavior and preferences in the mobile telecommunications industry to accomplish the objective of attracting and retaining customers to remain viable and dominant. This requires a deep understanding of the factors that influence consumer loyalty to a brand as well as the motivating factors for its sustenance. The main outcomes of this study will have substantial managerial implications for marketing and brand executives entrusted with the development of brand marketing strategy and an expansion drive geared towards customer-oriented expansion. Promotional pricing has a robust impact on brand customer loyalty, hence the importance of a thorough understanding of promotional pricing by the relevant company executives and managers for a knowledge-driven customer recruitment and market expansion drive. Such an understanding will empower and drive company policy and strategy towards attracting and retaining new customers, as well as cultivating and maintaining their loyalty. Also, customer satisfaction influences customer loyalty directly and is an immediate precursor to customer repurchase and referral behavior, so its understanding is important for strategy development by brand managers. Even though improving brand satisfaction is not a new notion, what this study proposes is that promotional pricing directly influences customer loyalty, brand switching, and customer satisfaction in order to encourage positive post-purchase customer behaviour and boost or maintain brand competitiveness, brand managers should focus on increasing levels of consumer satisfaction. The study's findings give the MTN Enugu service providers a better basis for understanding how much and for what reasons their customers become devoted. For instance, the study's findings revealed that, in the context of the MTN Enugu State mobile telecommunications business, promotional pricing is the most significant factor of customer loyalty, customer satisfaction, and customer brand switching. The results of this study have various managerial ramifications, which have become clear. First and foremost, in order to foster long-term relationships with customers, MTN must increase its promotional pricing in order to encourage ongoing customer loyalty and satisfaction. In order to draw in new customers and encourage the retention of current ones, MTN managers should develop and enhance current promotional pricing offer. Marketers in Nigeria's telecoms industry, in particular MTN Ltd., must evaluate promotional pricing offers to serve both immediate and long-term goals. To provide the greatest services for the welfare of the customers, extensive customer perspective study or evaluation of promotional pricing must be done; this will keep customers and avoid customer switching. MTN should provide beneficial promotional packages to brand their products and differentiate them from others. In addition, customers require exceptional customer service, MTN should therefore focus strongly on building customer satisfaction. It is imperative that MTN combine promotional pricing with customer satisfaction to ensure that their customers remain loyal in the long term. MTN must also consider building brand commitment as a prerequisite for enhancing customer loyalty. Finally, MTN should be honest and transparent in carrying out its promotional pricing campaigns. This is necessary because these issues impact the credibility of the promotion exercise as well as the integrity of the operator. When implementing its special price campaigns, MTN

might think about using marketing communication agency. Since it is not entirely run by employees of MTN Nigeria, this would maintain professionalism and lend credibility to promotions. Lastly, MTN Nigeria should be creative when conceptualizing and designing promotional pricing. Also, MTN Nigeria should endeavour to continue to give adequate publicity to promotional pricing while it lasts.

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Conflict of Interest

There is no conflict of interest, according to the author.

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Association between Prevalence of Talaromycosis and Economic Status in Asia

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Abstract

Previous studies have shown that geographic niche was a significant risk factor for developing T. marneffei (Tm) infection, and to date there are still lacking data of impact of economic status on the prevalence of Tm. Thus, we conducted this study, aiming to examine the correlation between prevalence of talaromycosis among HIV/AIDS-infected adult population and Asian country income, reported by World Bank data. A comprehensive medical literature review was performed to estimate the prevalence of T. marneffei infection among HIV/AIDS-infected adult population in Tm endemic and non-endemic countries and country income in Asia. Linear regression analyses were used to study the associations between Tm prevalence and Asian country income. Both unadjusted and adjusted models with Tm geographic distribution were analysed. A total of 48 Asian countries were included in the statistical analysis. Geographic distribution of talaromycosis was divided into three main regions: (i) Region 1: Regions of highest incidence of talaromycosis (>100 Tm cases reported in literature); (ii) Region 2: Endemic Tm countries and (iii) Region 3: Countries of imported or travel-associated Tm cases. Estimated Tm prevalence in the three regions were 3.9%, 2% and 0.02%, respectively. There was no statistical difference in GDP among three regions (P = 0.70). The linear regression analyses showed no associations between prevalence estimates of talaromycosis and Asian country income in both unadjusted and adjusted for geographic distribution of T. marneffei (P = 0.83). Most markedly, country geography is still a significant risk factor for T. marneffei infection *(P < 0.001).*

Keywords: *Economic status, Invasive fungal infections, Prevalence, Talaromyces marneffei, Vietnam.*

Introduction

Talaromyces marneffei (Tm) is a dimorphic fungus that can cause a life-threatening systemic infection in immunocompromised individuals living in or traveling to Southeast Asia and southern China [1, 2]. The Tm mortality on antifungal therapy ranges from roughly 10% to 30% [3-8]. Talaromycosis has been mainly reported in the Southeast Asia (particularly Thailand and Vietnam), southern China, Hong Kong, and Eastern India [3, 9]. Geographic distribution of talatomycosis has been increasingly reported [3, 9, 10]. The ecosystems including climatic conditions in the endemic regions can facilitate the growth of *T. marneffei*, combined with high humidity are important risk factors to expand the fungal reservoir in the environment and to enhance the fungal infection through air-borne transmission [3]. Recently, Narayanasamy et al. assumed an association between talaromycosis and poverty in Asia, based on mapping distribution of *T.*

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marneffei in correlation with Asian country income [10].

Most markedly, geographic restriction of talaromycosis in Asian countries in tropical and subtropical regions mostly falls in low and lower middle-income nations in which the Gross National Incomes per capita (or GDP) range from USD $ 1,036 to $ 4,045 annually, reported by the World Bank data [11]. Up to two-thirds of inhabitants in talaromycosis hyperendemic regions are living in poor rural areas, for instance 63% of the Vietnamese, 67% southern China provinces and 50% Thai population [10, 11]. On this basis, our primary study hypothesis was that low and low-middle-income countries had higher prevalence of talaromycosis than upper-middle-income and high-income countries, and there may be an association between Tm prevalence and economic status in Asian countries. Therefore, we conducted this study, aiming to investigate the possible association between prevalence of *T. marneffei* and economic status of countries in Asia, as defined by country income (GDP).

Materials and Methods

Ethics Statement

We used the secondary datasets from World Bank data from 2021 report [11] and from medical literature review for Tm prevalence estimates [12-21]. The study datasets were publicly available for accessibility. Using secondary dataset was causing less than minimal risk to study participants, in this respect the ethical clearance for this study was suggested to be waived off.

Study Setting, Design and Population

All Asian countries were included in the analysis to study the association between country incomes, reported by World Bank data report in 2021 [11], and talaromycosis prevalence estimates, based on available published data [12-21]. Geographic distribution of talaromycosis has three main regions [3, 9, 10]:

1. **Region 1**: ***Regions of highest incidence of talaromycosis*** (> 100 reported cases), including: China, Thailand and Vietnam.
2. **Region 2**: ***Endemic Tm countries***, including: Cambodia, Laos, Brunei, Myanmar, Indonesia, Malaysia, Singapore, Philippine, Hong Kong, Taiwan and India.
3. **Region 3**: ***Regions of imported or travel-associated cases,*** including: Japan, South and North Korea, Afghanistan, Yemen, Syria, Tajikistan, Bangladesh, Bhutan, Comoros, Kyrgyz Republic, Mongolia, Nepal, Pakistan, Timor-Leste, Uzbekistan, Armenia, Iran, Iraq, Jordan, Lebanon, Maldives, Turkmenistan, Saudi Arabia, United Arab Emirates, Israel, Oman, Kuwait, Qatar, Bahrain, Macau, British Virgin Islands, Palestine, Azerbaijan, Georgia.

Data Collection

We performed a comprehensive medical literature review to calculate estimates for *T. marneffei* prevalence (%) in HIV-infected population and Asian country income (in GDP per capita) retrieved from World Bank data (2021 report).

Study Assumption for Estimates of Tm Prevalence in Non-endemic Region

Due to the limited data of *T. marneffei* in non-endemic countries in Asia [16-21], assumptions were reasonably raised and used for the statistical analysis:

1. Neighbouring countries, sharing the similar geographic and climatic conditions would have the similar risk of Tm development.
2. Countries with unavailable data of Tm prevalence will be imputed the median Tm prevalence estimate of the whole areas (either regions 1, 2, or 3 as defined above).

For example, Oman is located in the middle east of Asia and classified as non-endemic Tm region reported with 02 incident Tm cases travelling to Southeast Asia among 10,000 HIV-infected people in the country [16]. Thus,

neighbouring countries juxtaposed with Oman such as, Yemen, Yemen, Syria, Iran, Iraq…etc, with unavailable Tm prevalence data would be assumed to have similar risk of Tm development as Oman and would share the median Tm prevalence estimate of the whole non-endemic region [16, 17].

Statistical Analysis

Summary statistics are either median (interquartile), or mean and standard deviation (± SD) for continuous variables and percentage (%) for categorical variables. The Fisher exact test was used to compare two proportions, and ANOVA tests with post-hoc Tukey pairwise comparisons were used for 03 group comparisons of continuous variables. Linear regression analysis was used to study the associations between Tm prevalence and Asian country income. Both unadjusted and adjusted models with geographic distribution of talaromycosis were analysed for associations, on the basis that geographic distribution in the defined regions is a significant factor for *T. marneffei* infection, as demonstrated in previous studies [3, 9, 10, 15]. Significance level was set at $P < 0.05$ for all analyses. R software was used for all statistical analysed.

Results

Tm Prevalence Estimates

Overall, the median estimated Tm prevalence was 2 % (95 % credibility interval: 0.02 % to 3.2 %), with the highest Tm burden in Vietnam, Thailand, and southern China with Tm prevalence, hovering around 4% among HIV/AIDS patients [6-9, 12-15]. Table 1 shows the estimates and 95% credibility interval of estimated Tm prevalence, categorized by levels of Tm endemic. The highest Tm density including Vietnam, Thailand and southern China had the median Tm prevalence of 3.9% (95% credibility interval: 3.3% – 6.4%) among people living with HIV/AIDS. The Tm prevalence in endemic regions had a median of 2%, while that of non-endemic Tm regions was estimated approximately 02 Tm cases among 10,000 HIV/AIDS patients. Most markedly, there were statistical differences in Tm prevalence in these three defined regions, with *P* value < 0.001 (Fisher exact test).

Table 1. Estimates of Tm Prevalence among Adult HIV/AIDS Population in Asian Countries

Tm Regions	**Tm prevalence estimates (%)**	***P*-value ***
Regions of highest Tm incidence	3.9 (3.3-6.4)	< 0.001
Endemic region	2 (2-2.1)	
Regions of disease imported or travel-associated areas	0.02 **	

Notes. Summary statistic is median of estimates and 95% credibility of interval. * P value withdrawn from Fisher exact test, ** 02 Tm incident cases among 10,000 HIV-infected people

Asian Country Incomes, Reported from World Bank 2021 Report

Table 2 presents incomes of Asian countries, categorized by Tm endemic. Markedly, there was no statistical difference in country income by GDP per capita (in USD), in three main regions of Tm endemic ($P = 0.70$). The further pairwise comparisons also revealed no differences in nation income among three Tm regions.

Table 2. Comparisons of Country Gross Domestic Product Per Capita (GDP) (in USD $) in Asian Countries by Endemic Regions of Talaromycosis

Tm endemic regions	**Mean**	**SD**	***P*-value ***
Region 1-Hyperendemic Tm regions	6,803	3,839	0.70
Region 2-Endemic Tm regions	15,872	21,357	
Region 3-Non-endemic regions or countries reported with travel-related Tm cases	12,552	15,647	
Pairwise comparisons between groups: income difference and *P* values **:			
Regions 1 and 2: Difference = 9,069 (USD), *P* = 0.96			
Regions 2 and 3: Difference = 3,320 (USD), *P* = 0.85			
Regions 1 and 3: Difference = 5,749 (USD), *P* = 0.84			

Statistics are means and standard deviation (± SD) for the parameter-GDP; * P-value withdrawn from ANOVA test for all three-group comparison; ** P-values from Tukey tests for pairwise comparisons between groups

Associations between Tm Prevalence and Economic Status (in GDP) in Asian Countries

As shown in Table 3, there were no associations between Tm prevalence and economic data in term of country GDP per capita in Asian countries from both unadjusted and adjusted linear regression analyses. Notably, in the adjusted linear regression, geographic distribution of *T. marneffei* was significantly associated with Tm prevalence.

In addition, Figure 1 represents the fitted line (bold blue line) for the association between Tm prevalence and Asian country GDP (USD). The fitted line was quite flat, indicating insignificant correlation between these two variables. The further analysis of model residual, showing the non-normality distribution as shown in Figure 2. This is mainly due to the limited data of Tm prevalence included in study analysis.

Table 3. Associations between Economic Status Demonstrated by Country Income in GDP Per Capita and Estimates of Prevalence of Talaromycosis in Asian Countries

Unadjusted linear regression analysis			
Coefficient	Estimate	SE	*P*-value*
Country income	0.00000588	0.00014	0.97
Adjusted linear regression analysis by geographic of Tm			
Coefficients	Estimates	SE	*P*-value**
Country income	0.00000898	0.00042	0.83
Tm geographic distribution (Reference = Region 1)			
Region 2 vs Region 1	-0.0281	0.003	<0.0001
Region 3 vs Region 1	-0.0451	0.0027	<0.0001

Statistics are estimates of coefficients and standard errors (SE); * P value withdrawn from unadjusted model; ** P value withdrawn from adjusted model with geographic distribution of talaromycosis

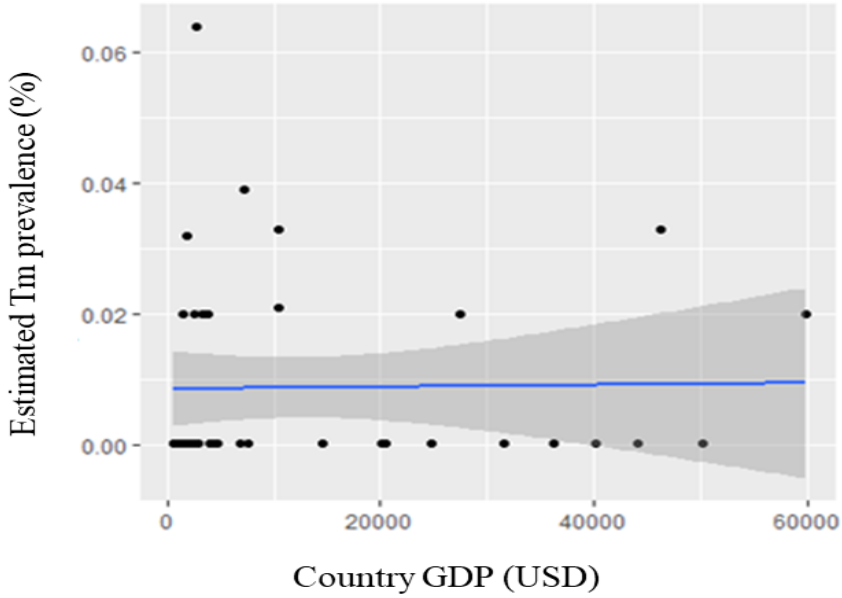

Figure 1. The Correlation between National GDP Per Capita and the Talaromycosis Prevalence Estimates in Asian Countries

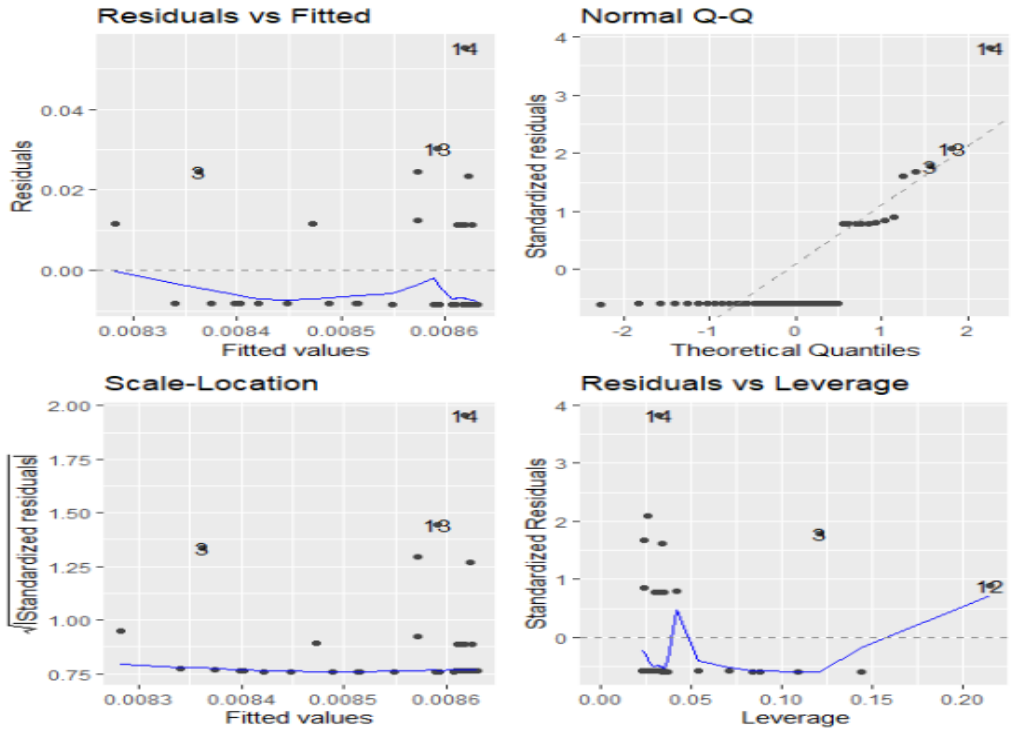

Figure 2. The Non-normality of Residual from Adjusted Linear Regression Model

Discussion

The findings from this study were quite consistent with previously published data about prevalence of *T. marneffei* infection among HIV/AIDS population [15]. Talaromycosis has remained a major burden among HIV populations in Asian countries [9, 15]. There has been a marked variation in Tm prevalence associated with geographic regions and countries in Asia. This study continued to firmly show the significant association between geographic areas and the prevalence of talaromycosis in Asian regions ($P < 0.0001$). Although Narayanasamy supported the correlation between frequency of talaromycosis

and economic status of countries enduring the Tm endemic in Asian regions [10], our study revealed no statistical association between Tm prevalence and economic status in both unadjusted and adjusted linear regression analyses. However, this study finding should be carefully interpreted because of limited data about Tm prevalence in non-endemic regions and non-normality of residual parameter from modelling. Markedly, our study finding is consistent with results reported from a systematic review and meta-analysis conducted by Qin Y et al. in 2020 that there was no statistical association between Tm prevalence and country income with odds ratios (OR) = 0.466 (95% CI: 0.771 to 2.831, $P = 0.393$, from the meta-regression analysis) [15]. On this basis, I support that geographic distribution of regions in defined Asian countries through favourable ecosystems and climatic conditions including humidity, temperature and particular in rainy seasons is still the most significant risk factor for *T. marneffei* infection and air-borne transmission [3]. Economic status has no association with the frequency of talaromycosis in Asian regions.

Our study has several limitations. Firstly, using secondary datasets to perform a post-hoc analysis is considered a primary limitation. Secondly, there were limited data about prevalence of talaromycosis reported in non-endemic regions so that the study lacks sufficient power to draw a robust conclusion.

Conclusion

This study showed no correlation between economic status, in term of country GDP per capita and the prevalence of talaromycosis in Asian countries. In addition, our study finding strengthens the impact of geography on the development of talaromycosis.

Conflicts of Interest

All authors declare no conflict of interest.

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Customer Perceptions on E-service Quality and Customer Loyalty in Botswana Telecommunications Sector

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Abstract

The study examined the effect of electronic service quality on customer loyalty with specific reference to the telecommunications sector of Botswana. In this context, the study focused on the players in the mobile telecommunications sector of Botswana, that is, BTC, Mascom and Orange Botswana. The study adopted a quantitative survey that was guided by the positivist research philosophy. The study sample comprised of 450 subscribers of mobile telecommunication services in Botswana who took part in an online survey undertaken through a structured questionnaire. The analysis of research data was done using the Statistical Package for Social Sciences in which multiple linear regression analysis was adopted as the method of data analysis. The study found that the efficiency of e-services had a significant positive effect on customer loyalty of mobile telecommunication service subscribers in Botswana ($\beta = 0.751$, $p = 0.000<0.05$). It was also found that there existed a significant direct relationship between fulfilment and customer loyalty of mobile telecommunication service subscribers in Botswana ($R = 0.519$, $p = 0.000<0.05$). The study further found that there existed a significant positive relationship between service availability and customer loyalty of mobile telecommunication service subscribers in Botswana ($\beta = 0.638$, $p = 0.000<0.05$). The study concluded that efficiency, fulfilment, and service availability had a significant positive effect in customer loyalty in the telecommunications sector of Botswana. The study recommended the improvement of service efficiency; mitigating regular transaction timeouts; enhancing customer knowledge management and customer relationship management; undertaking of gap analysis and conducting of quality circles.

Keywords: *Customer loyalty, Customer satisfaction, Electronic Service Quality, Efficiency, Fulfilment, service availability.*

Introduction

The business operating environment today is associated with a number of changes and challenges which often present existential threats to business organisation within the private sector as well as the public sector [1]. According to [2], the operating environment is complex, volatile, and ambiguous, therefore, it is incumbent on business organisations to be in a perpetual flux because being docile presents significant competitive and existential risks to the operations of the business entities. Similarly, [3], note that globalisation, technological advancements, innovation and change in customer expectations and perceptions drive the volatility that is evident within the operating environment and organisations owe it to themselves and their stakeholders to respond to the changes in a manner that is consistent with the actualisation of the vision and operational goals.

Organisations across the globe and across the sectoral divide are always conscious of the attainment of their performance targets because performance is instrumental in determining the extent to which the organisation survives, grows, and remains relevant in the face of a dynamic operating environment [4]. With this in mind,

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service organisations across the geographical and sectoral divide can differentiate themselves from their competitors on the basis on the quality of the service that they deliver [2]. [3] argues that customer loyalty and quality of service delivery are twin paths when it comes to the creation of value for both the organisation and the customers. The author observed that an organisation that offers poor quality of service risks losing its credibility and erodes its own confidence in the eyes of the customers and the impact of this is reflected in the poor customer satisfaction, low customer retention rates and poor financial performance. It should be noted that whilst service quality concerns itself with the creation of value and benefits to the customers in tandem with the expectation of the customers, shortcomings in this regard impacts on the relationship of the organisation and its clients [7].

The focus of this study is to examine the effect of electronic service quality on customer loyalty within the telecommunications sector. In this regard, the study's independent variable is electronic service quality.

According to [8] electronic service quality is the quality as well as excellence of electronic service offerings by an organisation in the virtual marketplace as per the customers' overall assessment. Whilst electronic service quality has several dimensions which include reliability; ease of use; efficiency; privacy, fulfilment, system availability, compensation, contact, and responsiveness, this study will measure electronic service quality based on efficiency, fulfilment, and system availability as per the E-S QUAL Theory.

The dependent variable in this study is customer loyalty which is defined by [9] as being the commitment by a customer to re-patronise and re-buy a product or service of their preference continuously at every opportunity. In the context of this study, customer loyalty will be measured in terms of repeat purchases, positive word of mouth and positive attitude. The undertaking of this study is not isolated to other studies that have been undertaken in the area of electronic service quality and customer loyalty and as such, recognition is given to the various studies that have been undertaken. In Greece [10]; [11] in the United States of America; [12] in China and [13] in South Africa found that there existed a positive and statistically significant relationship between electronic service quality and customer loyalty. On the other hand, [14] in France; [15] in Russia and [16] in Kenya found that electronic service quality did not have an effect on customer loyalty.

There currently exist differing opinions and contradictory empirical findings regarding the effect of electronic service quality and customer loyalty as illustrated in the brief review of empirical findings above. Further, the findings referred to above are all based on studies that have been undertaken in other countries and none of them reflects a study undertaken in Botswana. For that reason, it becomes difficult to generalise the findings to Botswana thus presenting a research gap in terms of empirical findings that relate to Botswana. On the other hand, the studies alluded to relate to studies earlier all in the retail sector and also in the banking sector and given the fact that this study wishes to focus on the telecommunications sector, it can further be deduced that there exists a research gap in that regard. All the aforementioned studies were all undertaken using different methodological approaches and these approaches differ significantly to the approaches to be adopted in this study and this again amplifies the existence of the research gap which the undertaking of this study seeks to bridge.

This study will focus on the Botswana mobile telecommunications sector which according [17] to has a 94.3% mobile penetration rate; 1,724,522 active subscribers; 1,836,299 active mobile internet subscribers; 6,661TB mobile data usage as of 31 December 2022 and three major mobile telecommunications service providers namely, Botswana

Telecommunications Corporation (BTC); Mascom and Orange Botswana. Table 1 shows the customer satisfaction index for the three telecommunications companies in Botswana as of 31 December 2022.

Table 1. Subscriber and Customer Satisfaction Data (2022)

	Year		
	BTC	**Mascom**	**Orange**
Service usage rate (%)	79%	88%	83%
Customer Satisfaction Index	4.30	5.66	5.27
Source	[17]		

Table 1 shows that at as 31 December 2022, BTC had a service usage rate of 79%, Mascom 88% and Orange 83%. Table 1 also shows that Mascom had the highest customer satisfaction index (CSI) of 5.66 points with Orange at 5.27 points and BTC at 4.30 points. According to [17] there was a decline in customer satisfaction to 5.08 CSI points in 2022 from 6.11 in 2018. This points to growing dissatisfaction amongst the customers in the telecommunications sector which all points to possible declining loyalty amongst the customers especially if one were to look at both the CSI and service usage rates. It is anticipated that a high CSI index is associated with high loyalty as denoted by the service usage rate.

However, in the case of the mobile telecommunication service providers in Botswana, the growth in subscribers, declining CSI and declining service usage raise questions regarding the electronic service quality within the sector and whether or not this has any bearing on customer loyalty.

The objectives of this study were:

1. To evaluate the effect of efficiency on customer loyalty in Botswana's telecommunications sector.
2. To examine the effect of fulfilment on customer loyalty in Botswana's telecommunications sector.
3. To evaluate the effect of service availability on loyalty in Botswana's telecommunications sector.

To respond to the above research objectives, the following research hypotheses were tested:

H_1: There exists a statistically significant relationship between efficiency and customer loyalty in the telecommunications sector.

H_2: There exists a significant relationship between fulfilment and customer loyalty in the telecommunications sector.

H_3: There exists a statistically significant relationship between service availability and customer loyalty in the telecommunications sector.

Literature Review

Theoretical Framework

The Electronic Service Quality Model (E-S-QUAL) model was developed from the work of [18] with a view to measure electronic service quality. According to [18], the E-S-QUAL model was developed from the SERVQUAL model which laid the foundation on service quality in general. The E-S-QUAL model. According to [18] the E-S-QUAL model is made up of 4 constructs of e-service quality namely, efficiency, fulfilment, system availability and privacy.

According to [8], the E-S-QUAL model is one of the latest models of measuring e-service quality and its scale of measurement of e-service quality has a significantly high level of validity. In support of this view, [19] argue that in all studies in which the E-S-QUAL model was used, it was found to have a very high level of validity as well as reliability which makes it a very competent model in measuring e-service quality. In spite of high validity and reliability, [20] falter the E-S-QUAL model for its lack of

exhaustiveness. In this context, [20] argue that the E-S-QUAL model only focuses on 4 dimensions of e-service quality and thus, its ability to measure e-service quality is only limited to efficiency, fulfilment, system availability and privacy. On the other hand, [7] criticise the E-S-QUAL model for its low predictive power which means that the E-S-QUAL model has a low predictive power over changes in e-service quality.

Even though the E-S-QUAL model faces a number of criticisms within literature, its strengths outweigh the weaknesses and for that reason, it is my view that it remains a very competent model. In line with this, this model was adopted as the key model for this study because of its high validity and reliability and more so, its alignment to the constructs of e-service quality adopted in this study.

Electronic Service Quality

According to [8] electronic service quality is the quality as well as excellence of electronic service offerings by an organisation in the virtual marketplace as per the customers' overall assessment. In line with this view, it is deduced that the electronic service quality from the view of the customer is a measure of extent to which the service received over virtual platforms meets and exceeds their expectations. In this regard, electronic service quality is based on the outcome of the electronic service that would have been rendered to them by the service provider which is based on what they get versus what they expected to receive over the virtual platforms [21].

On the other hand, [18] define electronic service quality as being the extent to which an organisation's website enables and facilitates efficient and effective purchasing, shopping and delivery of services and products. Whilst electronic service quality has several dimensions which include reliability; ease of use; efficiency; privacy and responsiveness [11], this study will measure electronic service quality based on reliability; efficiency and responsiveness.

According to [22], the retail managers' perspective of electronic service quality holds that electronic service quality should be embedded in the core strategies of the organisation on the basis that the effects of electronic service quality are often reflected in the market performance and goodwill of the organisation in the market. In this regard, [22] argue that electronic service quality is a tool through which an organisation can attain and maintain its strategic competitive edge over its competitors. This means that whilst the retail manager's view of service quality is also reflected in the outcomes of service delivery, the view is much more strategic and financial in nature than it is premised on the need to give maximum utility to the customers [23].

[23] notes that to the retail manager, electronic service quality is a tool through which the organisation can make an assessment of the extent to which their online service innovations and product developments have gone to satisfy the needs of their customers. In line with this view, the concept of electronic service quality remains a tool but, it is customer centric in that it seeks to evaluate the progress made by the organisation in putting in place electronic services that satisfy the customer's needs [24]. Within this context, an assessment of the level of electronic service quality by the organisation helps the management to be able to place into context how well their electronic services and the manner in which the services are digitally delivered to the customers fares well in relation to the specifications and ratings by the customers [24].

Customer Loyalty

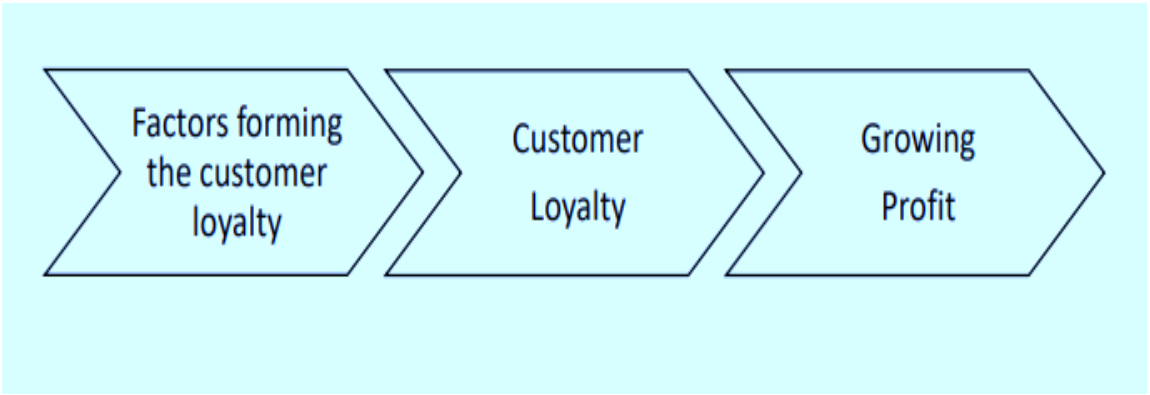
Customer loyalty has been defined differently by various scholars mostly in terms of what should be the scope of customer loyalty and what its determinants and measures are. As defined by [25], customer loyalty is an expression of the commitment to re-patronise a service and rebuild a relationship with a service provider regardless of factors and circumstances that might motivate

the desire to switch service providers in the future. In this regard, [25] further argued that customer loyalty represents the manner of strength that underlies the relationship between re-patronage and the general attitude of the individual customer to the organisation and its services. It goes without say that customer satisfaction is a critical determinant of any business success story, but in isolation, customer satisfaction can't take the organisation to greater heights of prosperity [26]. Though the inevitable repeat purchases that are stimulated by customer satisfaction, it can be concluded that customer satisfaction has a positive impact on the financial fortunes of an organisation [27].

In today's market where the customers are fickle and self-aware and largely dynamic to the evolving and changing times, creating, and maintaining a base of satisfied customers is proving to be a mammoth task for organisations in operation today [28]. This elevated level of customer expectations can be attributable to the widespread use of technology which has enhanced the ease with which customers can access information on what's happening around them, with this information, the customers' expectations are thus evolving and non-static [29]. Thus, loyalty building is premised on the thrust by the organisation to tailor its services to the attainment of the utmost value by its customers such that in a way, they can illustrate and demonstrate their commitment to build and sustain relationships with their customers [30].

According to [31], customer loyalty is a basis for sustained profitability by the organisation. It was their argument that loyal customers have the propensity and proclivity to encourage those within their social circles to try the services of the organisation whose services they find satisfying. To this end, it is important to note that customer loyalty isn't incidental but rather it is a result of deliberate efforts by the service providers to satisfy their customers from product design, service delivery and initiatives after the first and subsequent sales of services.

Customer loyalty is a process and the result of multiple interactions and transactions between the organisation and its customers [19]. In actualising customer loyalty, organisations should understand that it is imperative and pertinent that thy establish and maintain a strong relationship with their customers because without a relationship, customer satisfaction and loyalty become myths that might prove elusive in the entire lifespan of an organisation [32]. According to [33] customer loyalty is divided into three distinct categories namely, emotional loyalty, intentional loyalty, and behaviour loyalty. Behaviour loyalty speaks to the acts by customers of repeat buying of the organisation's services. Intentional loyalty is attributable to the possible intention of buying an organisations' services and emotional loyalty an expression of the way the customer feels about the organisation and the value that they derive from the organisation [33].



Source:[33]

Figure 1. Model of Customer Loyalty

As illustrated in Figure 1, customer loyalty is a process involving a connection between deliverables that inform it. According to customer loyalty model, understanding the needs and wants of the customers are key components of customer loyalty as a whole [34]. It was argued by [19] that an organisation should thus pay attention to its pricing and promotional strategies to ensure that they meet the mark of expectations by their customers thus derive customer loyalty from such satisfaction. It is also important that the organisation creates an environment of comfort and trust between the organisation and its customers regardless of their diversity [20].

Electronic Service Quality and Customer Loyalty

[26] examined the effect of e-service quality on customer loyalty of commercial banks in Jaffna district, Sri Lanka. The study sought to examine the extent to which customer loyalty was influenced by the e-service quality amongst the commercial banks. A sample of 400 employees was drawn from 5 commercial banks using stratified random sampling to which structured questionnaires were administered for the purposes of data collection. The findings from the Spearman correlation analysis revealed that there was a strong positive and statistically significant correlational relationship between measures of e-service quality and measures of customer loyalty.

In the same regard, [35] found that e-service quality was a significant predictor of customer satisfaction and by extension, customer loyalty. This finding emerged from a study undertaken by [35] in Indonesia to examine, in part, the effect of e-service quality on customer loyalty. The study sample comprised of 225 randomly selected online customers. Data were collected using a structured questionnaire and analysed using structured equation model. The findings revealed that there existed a significant positive relationship between e-service quality and customer loyalty. On the other hand, [36] undertook a study to examine the impact e-service quality on customer satisfaction and online shopping behaviour. The study found that e-service quality had an indirect relationship with customer loyalty and the relation was mediated by customer satisfaction.

[37] also undertook a study with a view to examine the effect of e-service quality on customer loyalty in the United Kingdom. In this study, the researcher sought to examine if there existed a relationship between e-service quality and customer loyalty. The study administered a structured questionnaire to 151 respondents. The findings from the Pearson correlation analysis revealed that e-service quality had a significant effect on customer loyalty. In this regard, it was concluded that there existed a direct significant relationship between e-service quality and customer loyalty in the United Kingdom.

In a related study, [27] inquired into the effect of e-service quality and customer relationship management on customer loyalty with customer satisfaction as the mediating variable. The study was conducted in the retail sector in Indonesia from which data were collected from a sample of 248 retail sector online shoppers who were on Instagram. The findings from the study revealed that e-service quality did not have a significant effect on customer satisfaction. It was also found that e-service quality only had an effect on customer loyalty through customer relationship management practices and customer satisfaction. The study thus concluded that, e-service quality had an indirect relationship with customer loyalty.

Methodology

The study was guided by and grounded by the positivism research philosophy. According to [38], positivism is a research philosophy within which the researcher focuses on the collection, analysis, and utilisation of quantitative research data from the study population in response to a set of research questions. In addition, a quantitative survey research design was adopted which allowed for the collection of quantitative

data from the respondents and also the collection of data from multiple sources within the telecommunications sector. A structured questionnaire was administered thorough an online survey in which the researcher sought responses from 450 subscribers across the three main mobile telecommunications service providers in Botswana. The Statistical Package for Social Sciences was used to analyse research data in which case, multiple linear regression analysis was used to test the nature, strength and significance of the relationship between e-service quality and customer loyalty.

The regression model that was adopted for this study is given below:

$$CL = \propto + \beta_1 EFF + \beta_2 FL + \beta_3 SA + \mu - Equation\ 1$$

CL = Customer loyalty
EFF = Efficiency
FL = Fulfilment
SA = Service availability
μ = Error term

Results and Discussion

Respondents' Profile

The study sample comprised of 450 respondents and of these, 51.1% (n = 230/450) were female and 48.9% (n = 220/450) were male. The sample was comprised 17.3% (n = 78/450) respondents who were below the age of 21 years; 40.7% (n = 183/450) between the ages of 21 and 29 years; 22.4% (n = 101/450) between 30 and 39 years of age; 12% (n = 54/450) were aged between 40 and 49 years and 7.6% (n = 34/450) were between 50 and 59 years of age.

Hypothesis Testing

The study also ought to test research hypotheses relating to the relationship between e-service quality and customer loyalty. the study thus tested the hypotheses given below:

H_1: There exists a statistically significant relationship between efficiency and customer loyalty in the telecommunications sector.

H_2: There exists a significant relationship between fulfilment and customer loyalty in the telecommunications sector.

H_3: There exists a statistically significant relationship between service availability and customer loyalty in the telecommunications sector.

The study utilised multiple linear regression analysis to test the hypotheses above and in order to guarantee that assumptions for multiple linear regression analysis tests are met, the study concluded tests for autocorrelation and multicollinearity.

Test for Autocorrelation

The Durbin-Watson test was undertaken in order to test for autocorrelation and the findings are given in Table 2.

Table 2. Durbin-Watson Statistic

Model	Durbin-Watson
1	1.924

Source: Primary Data

The findings in Table 4.8 show the Durbin-Watson statistic = 1.924. The Durbin-Watson statistic in this regard was greater than 1.5 and less than 2.5 thus indicating the absence of significant autocorrelation problems. This is consistent with the view of [39] that a Durbin-Watson statistic between 1.5 and 2.5 indicates that there exist no significant autocorrelation challenges. In the context of this study, the finding indicates that multiple linear regression analysis can be conducted since the assumption of absence of autocorrelation was satisfied.

Test for Multicollinearity

The findings from the test for multicollinearity are given in Table 3.

Table 3. Tolerance and VIF Statistics

Model	Collinearity Statistics	
	Tolerance	VIF
Efficiency	.668	1.498
Fulfilment	.833	1.200
Service Availability	.604	1.656

Source: Primary Data

Table 3 shows that all of the study's variables, that is, efficiency, fulfilment, and service availability, did not approach multicollinearity. This is based on the fact that all the variables had a tolerance statistic which was greater than 0.10 and a VIF statistic that was less than 10. This agrees with [40] who argued that multicollinearity is deemed to be absent if the tolerance statistic is > 0.10 and the VIF statistic is <10.

Multiple Linear Regression Analysis

Tables 4 and 5 present the findings from the multiple correlation analysis.

Table 4. Model Summary for Multiple Linear Regression Analysis

Model	R	R Square	Adjusted R Square	S.E. of the Estimate	Durbin-Watson
1	.842[a]	.709	.704	.31386	1.924

Source: Primary Data

Table 4 shows that the R-Square statistic from the regression model was 0.709. In line with this finding, it can be deduced that 70.9% of the changes in customer loyalty within the telecommunication organisations in Botswana can be explained by the variables, efficiency, fulfilment, and service availability when taken as a unit. In addition, the finding shows that the study's variables have a strong explanatory power over the variations in customer loyalty. The regression coefficients are given in Table 5.

Table 5. Regression Coefficients for E-Service Quality and Customer Loyalty

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		β	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.146	.116		35.836	.000	-	-
	EFF	.751	.048	.613	1.554	.000	.668	1.498
	FL	.519	.021	.482	1.253	.000	.833	1.200
	SA	.638	.052	.604	1.463	.000	.604	1.656
a. Dependent Variable: CL								

Source: Primary Data

The findings in Table 5 show that the predictor variables (EFF, FL, and SA) all were significant at 5% LOS. The findings also show that efficiency has the highest standardised regression coefficient of 0.613 and fulfilment had the least at 0.482.

Taking into account the findings in Table 5, the multiple linear regression model for this study was given by:

$$FP = 4.146 + 0.751EFH + 0.519FL + 0.638SA + \mu - Equation\ 2$$

Efficiency and Customer Loyalty

Table 5 shows that increasing efficiency in e-service quality by a unit would result in a

corresponding increase in customer by a factor of 0.751 units. In this regard, the findings show that there exists a significant positive relationship between efficiency and customer loyalty. The finding that there existed a statistically significant correlation between efficiency and customer loyalty could be attributed in part to the fact that customers are interested in greater efficiency when they select a mobile service provider and if they experience efficiency, their satisfaction will be expressed through their continued patronage of the services offered. In the same manner, with efficiency, customers are drawn to be loyal to the services of the organisation and their loyalty will be expressed in their willingness to speak positively to their social circle thus drawing more customers to the organisation. This finding thus aggresses with [41, 42] who all found that efficiency of electronic service platforms had a significant effect on customer loyalty. The study, therefore, accepts the hypothesis that, there exists a statistically significant relationship between efficiency and customer loyalty in the telecommunications sector.

Fulfilment and Customer Loyalty

Table 5 also shows that a unit increase in fulfilment would result in an increase in customer satisfaction by 0.519 units. The findings in overall terms show that fulfilment had a significant effect on customer loyalty. The study, therefore, has adequate evidence at hand to accept the hypothesis that there exists a significant relationship between fulfilment and customer loyalty in the telecommunications sector. The findings in Table 5 could be attributed to the fact that even though the subscribers enjoyed a level of fulfilment which was satisfactory to the extent that they were willing to continue their relationship with the organisations. In this regard, their willingness to continue using the services of their mobile telecommunications service provider and not switch to other service providers was a display of their level of loyalty which enhanced their willingness to continue being clients. This finding agrees with [26] and [35 who all found that there existed a significant direct relationship between fulfilment and customer loyalty.

Efficiency and Customer Loyalty

The study also found that there existed a significant relationship between service availability and customer loyalty. In this regard, a unit increase in service availability would result in a corresponding 0.638 units increase in customer loyalty. Given this finding, the study accepts the hypothesis that, there exists a statistically significant relationship between service availability and customer loyalty in the telecommunications sector. This finding could be attributed to the fact that mobile telecommunication is based on the availability of network services across the country. In this regard, the availability of network and internet coverage without interruption entails that customer convenience will be high. Thus, the more the services are available, the greater the level of customer loyalty. This finding is consistent with the finding by [37] who found that there existed a significant direct relationship between service availability and customer loyalty.

Summary and Conclusion

The study examined the effect of electronic service quality on customer loyalty with specific reference to the telecommunications sector of Botswana. The study's specific objectives were (1) To evaluate the effect of efficiency on customer loyalty in Botswana's telecommunications sector. (2)] To examine the effect of fulfilment on customer loyalty in Botswana's telecommunications sector. (3) To evaluate the effect of service availability on loyalty in Botswana's telecommunications sector. The study also sought to test the following hypotheses: (H_1) There exists a statistically significant relationship between efficiency and customer loyalty in the telecommunications sector. (H_2) There exists a

significant relationship between fulfilment and customer loyalty in the telecommunications sector. (H_3) There exists a statistically significant relationship between service availability and customer loyalty in the telecommunications sector.

The study found that the efficiency of e-services had a significant positive effect on customer loyalty of mobile telecommunication service subscribers in Botswana ($\beta = 0.751$, $p = 0.000<0.05$). It was also found that there existed a significant direct relationship between fulfilment and customer loyalty of mobile telecommunication service subscribers in Botswana ($R = 0.519$, $p = 0.000<0.05$). The study further found that there existed a significant positive relationship between service availability and customer loyalty of mobile telecommunication service subscribers in Botswana ($\beta = 0.638$, $p = 0.000<0.05$).

The study makes the following recommendations:

1. **Improve service efficiency:** The study recommends that mobile telecommunications service providers should enhance the efficiency and speed with which their mobile and electronic platforms which process customer transactions. This might involves creating direct USSD codes on platforms for all electronic transactions such that, the number of prompts is minimised, and customers can complete a transaction with a few clicks.
2. **Mitigating regular transaction timeouts:** One of the issues that negatively impact on e-service quality is quite timeout of transactions. In this regard, this study recommends that the organisations should enhance their processes so that transactions do not time out early because there are clients who are slow in issuing command on their devices and the more the transactions timeout, the more they will complete transactions after several attempts.
3. **Gap analysis:** The study recommends that mobile telecommunication organisations in Botswana should regularly conduct gap analysis. As part of their weekly or monthly returns, they should assess the e-service quality gap and in so doing, timeously assess and correct their shortcomings in the area of e-service efficiency, fulfilment, and service availability.
4. **Enhancing customer knowledge management and customer relationship management:** The study further recommends that, organisations in the telecommunications sector should put in place customer knowledge management and customer relationship management initiatives. If the organisations institute CKM and CRM initiatives, they will be able to know the expectations of their clients better and the more they know of these expectations, the more they will be able to deliberately institute e-service delivery programs that target the surpassing of the expectations of the customers.
5. **Conducting of quality circles:** Quality circles allow the organisation to be able to appraise their own performance on the service delivery and service quality front and to also share ideas on how they can improve on any areas that would have been found to be lacking. This also involves making service downtime a key review area during quality circles so that, service availability can be enhanced.

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Conflict of Interest

The author declares that there is no conflict of interest.

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Decentralized Clinical Trials – Systematic Review of Methods, Awareness, and Inclusiveness in Clinical Research

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Abstract

"Decentralised" trials (also known as hybrid, remote, or virtual trials) are the trials that covers a wide range of services and solutions that can be mixed and matched based on the conditions, preferences, and needs of patients, clinical locations, and sponsors. The research on Decentralised Clinical Trials is carried out through a series of interviews to better understand the perspectives of stakeholders involved in the DCT and how the industry accelerates and fast tracks the digital transformation to strive for paperless and patient-centric outcomes. In the present study, the data Collection were performed through extensive survey with the detailed questionnaire on the awareness of DCT, applied DCT tools in their research project, benefits and challenges overcome during the trial and DCT applications during the list of study phases, timeframe for using the rapid adoption of DCT. The current study's findings give significant evidence that decentralised clinical trials offer a promising new strategy to clinical research, allowing for speedier, more efficient, and more flexible study designs. DCTs are set to become an increasingly essential element of the clinical research landscape as digital technologies evolve and improve, providing new opportunities to enhance healthcare outcomes for all.The use of DCT in clinical trials has the potential to overcome a number of important drug development difficulties. DCT solutions may improve easier data collection, patient adherence and overall retention rates in addition to improving patient access and convenience.

Keywords: *Anticipated challenges, Clinical trials, COVID pandemic; Decentralized trials, Feasibility; Health care.*

Introduction

Clinical trials are critical for the development of novel medicines, and excellent trial results considerably promote regulatory approval and the market launch of novel pharmaceuticals [1]. Each new drug and treatment began with volunteers taking part in clinical trials. The current high standards of medical care are purely based on the studies conducted under the supervision of the US Food and Drug Administration (FDA). Clinical trials, in addition to testing novel medications and equipment, provide a scientific foundation for guiding and treating patients. Even if researchers do not get the expected findings, trial data can put scientists in the right direction [2].

Clinical trials are a fundamental tool used to evaluate the efficacy and safety of new drugs and medical devices and other health system interventions. The traditional clinical trials system acts as a quality funnel for the development and implementation of new drugs, devices and health system interventions. The concept of a “digital clinical trial” involves leveraging digital technology to improve participant access, engagement, trial-related measurements, and/or interventions, enable

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concealed randomized intervention allocation, and have the potential to transform clinical trials and to lower their cost. They are the safest and quickest way to uncover new therapies and techniques to improve health when done correctly.

Given the pandemic's concerns, pharma industries are seeking for solutions to minimise disruptions to their research. The decentralisation of trials is one technique that is gaining attraction. Decentralised clinical trials (DCTs), in contrast to the standard clinical trial approach, are carried out through telemedicine and mobile/local healthcare providers [4]. DCTs have been quiet inactive to acquire attraction, accounting for only 0.5% of all trials, with 63% in North America and 23% in Europe [5]. Recognising the barriers to DCT adoption, a recent poll indicated that 78% of clinical trial professionals believed the pandemic was promoting DCT usage [6].

DCTs employ "virtual" techniques such as telemedicine, sensory-based technologies, wearable medical devices, home visits, patient-driven virtual health care interfaces, and home drug and material delivery [7]. Subject recruitment, study medication delivery and administration, and trial outcome data gathering all occur in a completely decentralised clinical trial, with no in-person contact between the study team and the patient/subjects[8].

The primary reason for selecting this research topic is to critically evaluate the Clinical Research Industries awareness on the emerging concept of Decentralised Clinical Trials and to comprehend how the application of DCT tools plays a significant role in patient retention and data quality from the study sponsors and Investigational Sites perspectives. Although the Global Pandemic hastened the adoption and popularity of DCTs, it has also caused pharmaceutical companies to consider this as a mainstream, there are several questions to be answered about whether DCTs were carried out with proper adoption and implementation, and whether this has improved patient experience on safety usage of clinical trials.

Materials and Methods

The research on Decentralised Clinical Trials is carried out through a series of interviews to better understand the perspectives of stakeholders involved in the DCT and how the industry accelerates and fast tracks the digital transformation to strive for paperless and patient-centric outcomes. This research problem analysis is based on survey results from various clinical research stakeholders from drug companies, contract research professionals, and hospital research institutions who have experience conducting clinical trials and have participated in clinical research and trials during the COVID-19 Pandemic. To be consistent with the specified clinical trial, there is an express demand that digital technologies be used generally to permit more pragmatic, reduced Site travel in parallel.

Data Collection were performed through extensive survey with the detailed questionnaire on the awareness of DCT, applied DCT tools in their research project, benefits and challenges overcome during the trial and DCT applications during the list of study phases, time fame for using the rapid adoption of DCT.

1. Detailed Survey is being designed and conducted with the clinical research professionals who are actively participated on clinical trials through SURVEY MONKEY.
2. Survey is being conducted to observe the methods, understanding and awareness on the Decentralized Clinical Trial approaches among various stakeholders.
3. In the electronic survey conducted, the link was sent to 50 participants of which 32 responses were received from different health care professionals. The current job role of clinical research professionals were 88% CRO Sponsor Personnel, 3% were Clinical Research Coordinators and 9% were Other Investigational site staffs.

4. The awareness survey on DCT by clinical research professionals was carried out globally. 12 professionals from India, 5 from Singapore and 5 from Australia, 1 from China, Croatia, Denmark, Georgia, Japan, Poland, Republic of Korea, Serbia, Spain, use and USA responded to the Questionnaire.
5. 75% of the respondents were involved in pharma sponsored trial, 3% were involved in Investigator initiated trial and the remaining 22% were involved in combination of both pharma sponsored and Investigator initiated trial.

IRB Approval

Under FDA regulations, an IRB is an appropriately constituted group that has been formally designated to review and monitor biomedical research involving human subjects. In accordance with FDA regulations, an IRB has the authority to approve, require modifications in (to secure approval), or disapprove research.

The Ripon independent ethics committee reviewed, discussed and approved the Research Proposal (Application no: TEHTA00001) to conduct the Research entitled "Decentralized Clinical Trials-– Systematic review of Methods, Awareness, and Inclusiveness in Clinical Research".

Confidentiality of the Survey Participants was maintained, and the required consent was obtained prior to survey and all the research participants were informed about the study objective. Also the survey participants were being informed that the participation for the study was a voluntary participation and analysis was taken for the research purpose.

The following questionnaire were framed and distributed to professionals

1. 75% of the respondents were involved in pharma sponsored trial, 3% were involved in Investigator initiated trial and the remaining 22% were involved in combination of both pharma sponsored and Investigator initiated trial.
2. The questionnaire contained the following.
   a. Demographic responses.
   b. Type of Clinical Trial Involved.
   c. Number of clinical trials involved in past 3 years.
   d. Awareness on usage of DCT.
   e. Experience of Utilizing DCT methodology.
   f. Feasibility of using DCT.
   g. Promising future of DCT in Clinical trial.
   h. Adoption of DCT during pandemic.
   i. Reachability of DCT to clinical trial participants.
   j. Readiness to adopt DCT methodologies.

Results and Discussion

In the electronic survey conducted 32 responses were received from different health care professionals. From the data obtained, among clinical research professionals. 88% were CRO Sponsor Personnel, 3% were Clinical Research Coordinators and 9% were Other Investigational site staffs. This study does not contain any inputs from site investigators.

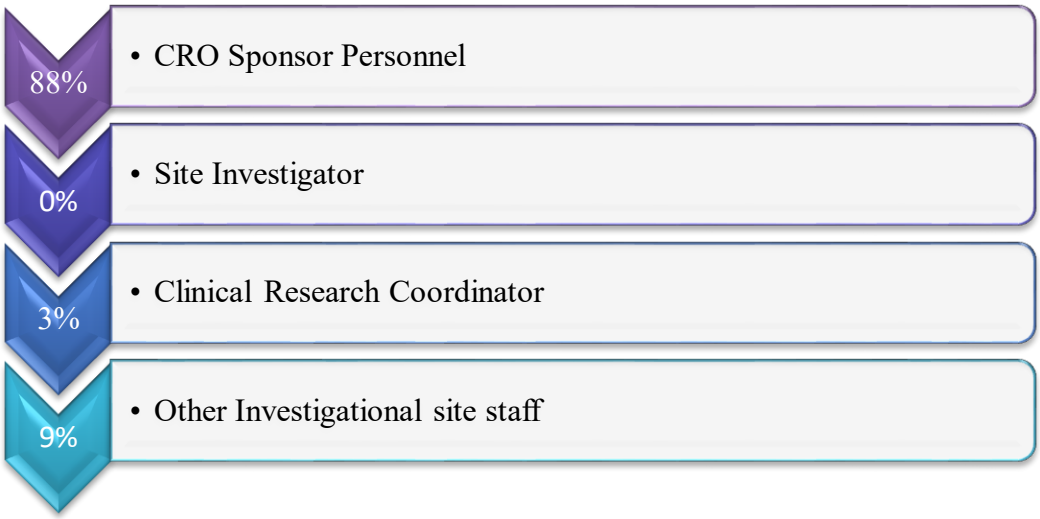

Figure 1. Current Job Role of Clinical Research Professionals

In the electronic survey conducted 32 responses were received from different health care professionals. Figure 1 represents the current job role of clinical research professionals. 88% were CRO Sponsor Personnel, 3% were Clinical Research Coordinators and 9% were Other Investigational site staffs. This study does not contain any input from site investigators.

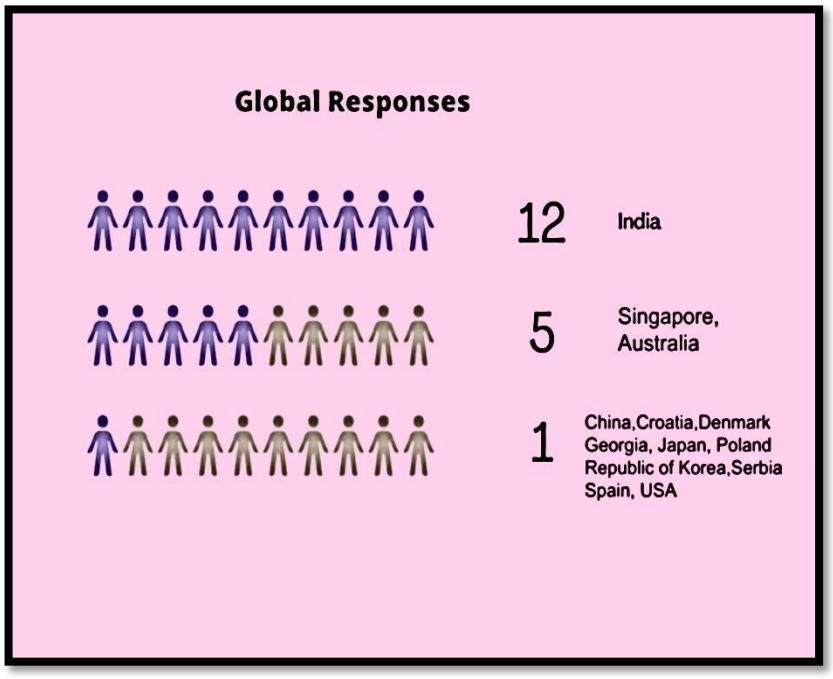

Figure 2. Demographic Responses

Figure 2 show the demographic responses. The awareness survey on DCT by clinical research professionals was carried out globally. 12 professionals from India, 5 from Singapore and 5 from Australia, one from China, Croatia, Denmark, Georgia, Japan, Poland, Republic of Korea, Serbia, Spain, USA responded to the Questionnaire.

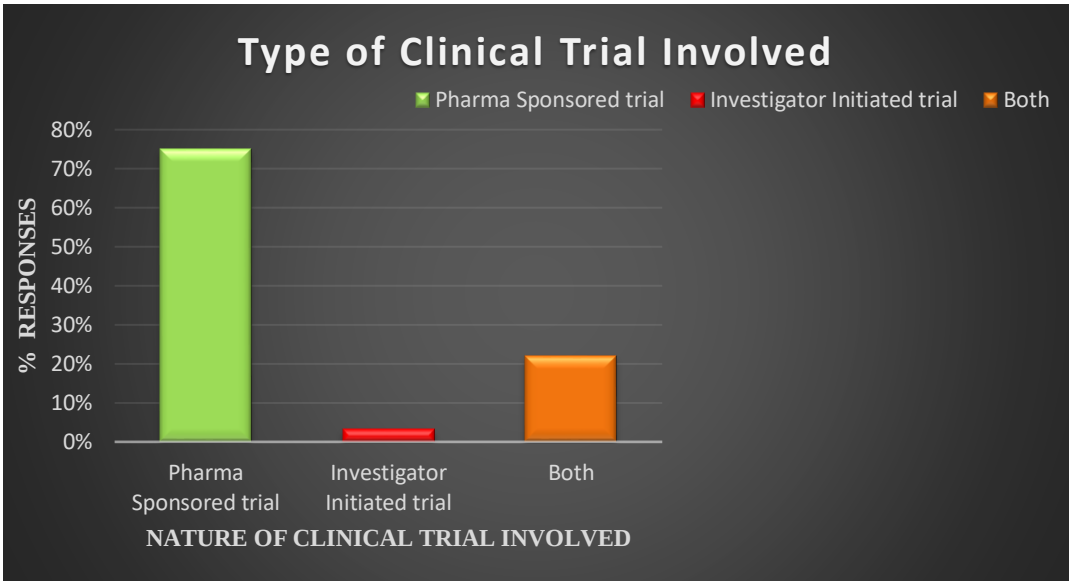

Figure 3. Type of Clinical Trial Involved

Figure 3 showcases the type of Clinical trial involved. 75% of the respondents were involved in pharma sponsored trial, 3% were involved in Investigator initiated trial and the remaining 22% were involved in combination of both pharma sponsored and Investigator initiated trial.

Clinical trials are not, and cannot be, designed to determine all the potential uses for a medication. IITs expand product knowledge, including safety. The driving need for Investigator Initiated Trials is that the clinical trials cannot be intended to cover all of a drug's possible applications. IITs broaden consumer product understanding, encompassing safety.

Medical researchers or physicians find novel application for currently used therapies by using the input of IITians and therefore non industry sources of data are always given more weight [9]

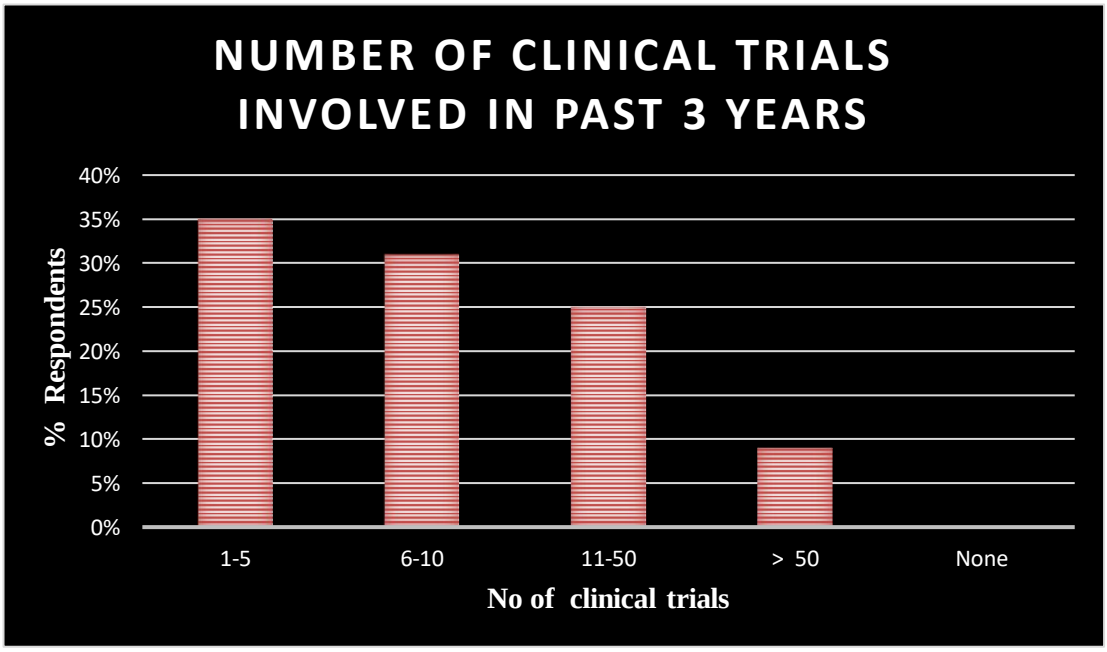

Figure 4. Number of Clinical Trials Involved in Past 3 Years

In the study conducted, it was found that 38% of the respondents reported being involved in around one to five clinical trials over the past 3 years. Out of the respondents surveyed, 31% reported having handled 6-10 clinical trials.25% respondents have handled 11-50 clinical trials. 9% were involved in handling more than 50 clinical trials.

Clinical trials are very mandatory to strengthen the evidence of efficacy and safety of new therapies. The diversity of clinical trial participants is often required to ensure that the trial population is representative of the patients who will use the medicine or medicinal product and ensure that the results are generalizable [10-11]. However, increasing clinical trial diversity in an effective, sustainable, and scalable manner remains a mutual challenge for the pharmaceutical industry, academic institutions, and clinical research overall. Health care professionals play a critical role in clinical trials, as they are directly involved in various aspects of the trial process. By participating in clinical trials, health care professionals contribute to advancing medical knowledge and improving patient care. They play a vital role in the development of new treatments and therapies.

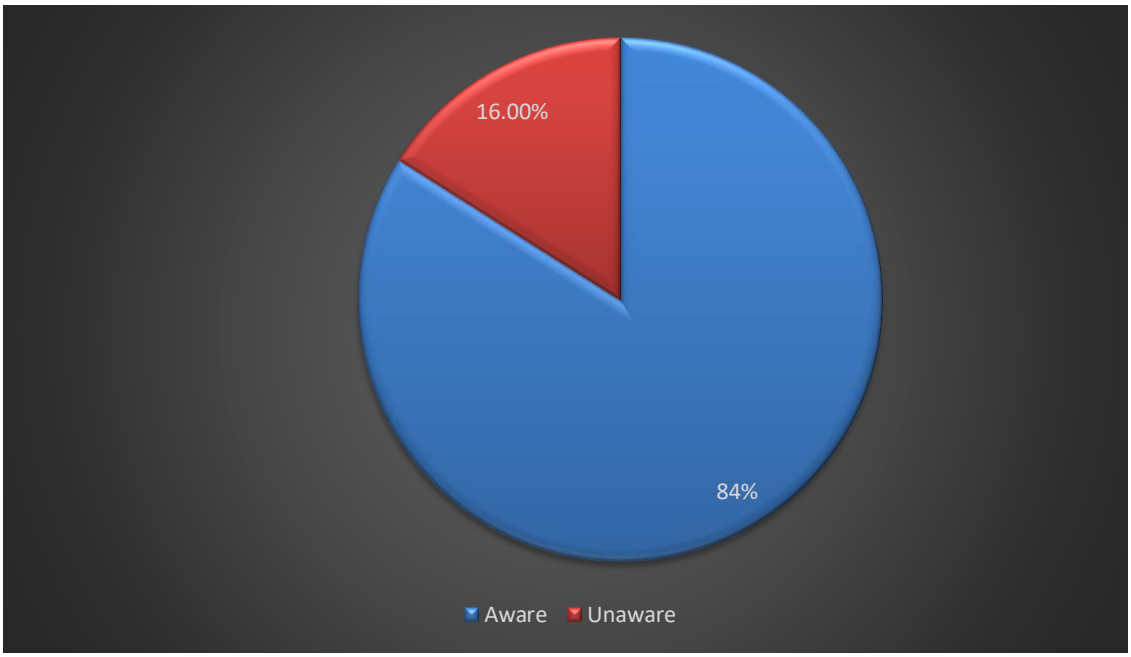

Figure 5. Awareness about DCT

Figure 5 depicts the awareness about the effective usage of DCT by clinical research professionals. 84% of the respondents were aware of the various DCT methods and 16% of Clinical research professionals were unaware of DCT.

Decentralised clinical trials (DCTs) use digital technologies and other means to allow patients access to clinical research, remote data collecting and monitoring, and communication between investigators and participants. Diabetes, neuro-rehabilitation, cardiovascular disorders, lung diseases, and, more recently, COVID-19 are among of the therapeutic areas where DCTs are most readily relevant [12]

As DCT is patient centric approach, 84% respondents adopted well to DCT. As technologies continue to advance, the process of collecting, transferring, and storing electronic data becomes increasingly streamlined. Simultaneously, both patients and healthcare providers are rapidly enhancing their tech savviness and embracing telemedicine with greater comfort (FDA) and this study also confirms that the clinical research professionals have upgraded themselves to use DCT along with traditional onsite treatment [13] (FDA,

2023). DCTs eliminate waiting hours, contact with other patients' suffering, hospitalisation in some situations, and potential exposure to microorganisms in hospital settings that might cause difficulties [14-17].

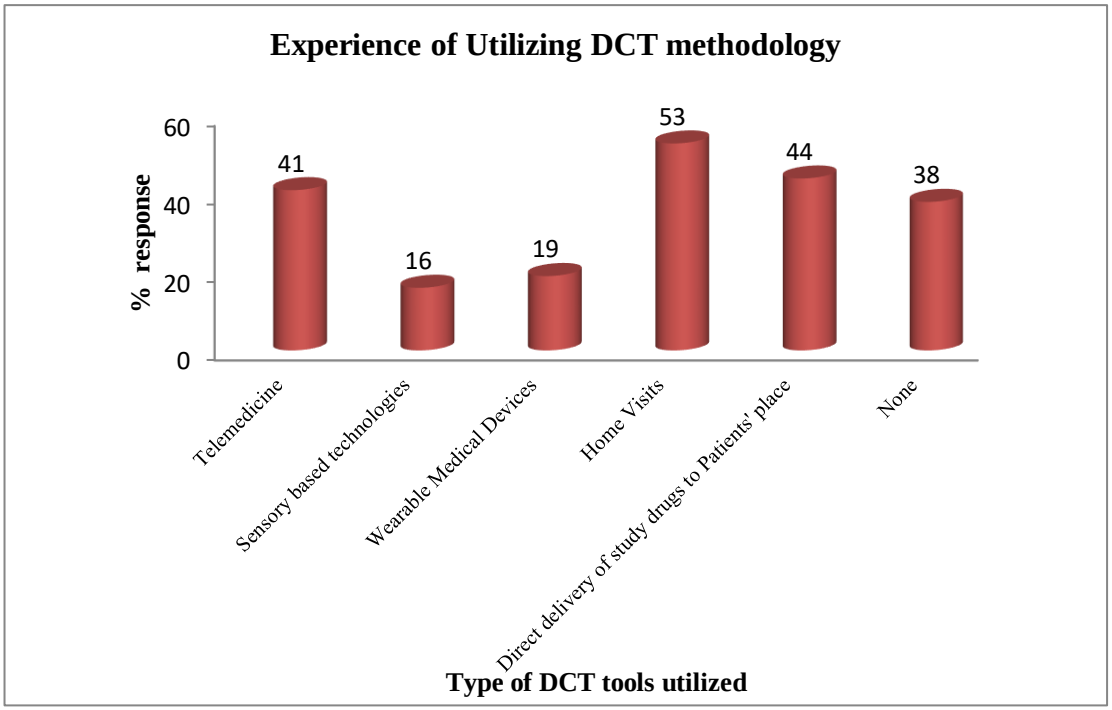

Figure 6. Experience of Utilizing DCT Methodology

The different DCT methodologies utilized by clinical research professionals is depicted in Figure 6. 41% CRP's has used telemedicine for treating their patients and 19% has experimented DCT by making usage of wearable medical devices. 16% has opted for sensory based technologies. More than half the respondents (53%) preferred home visits and 44% supplied the drugs directly to the participants. This study shows that the Clinical research professionals have experience in decentralised clinical trials. Digital health technologies (DHTs), which are systems that directly collect patient health information for clinical trials, are frequently used in DCTs. Numerous DHTS are portable devices, including spirometers (measuring devices for lung function), glucose monitors, blood pressure monitors, and activity trackers. These sensors can be ingested, implanted, or worn. DHTs also have interactive mobile applications that let users rate their level of happiness, level of pain or depressive symptoms, level of everyday functioning, or take tests of functional abilities including cognition, coordination, and vision. DHTs can capture data much more frequently than scheduled trial visits, sometimes even constantly, in addition to being more convenient. Additionally, these technologies record participant routines in order to gather data on the treatment's efficacy and security in "real life." Practically speaking, DCTs can decrease or eliminate the requirement for the resources associated with a traditional site, which can ultimately save time and money [18]

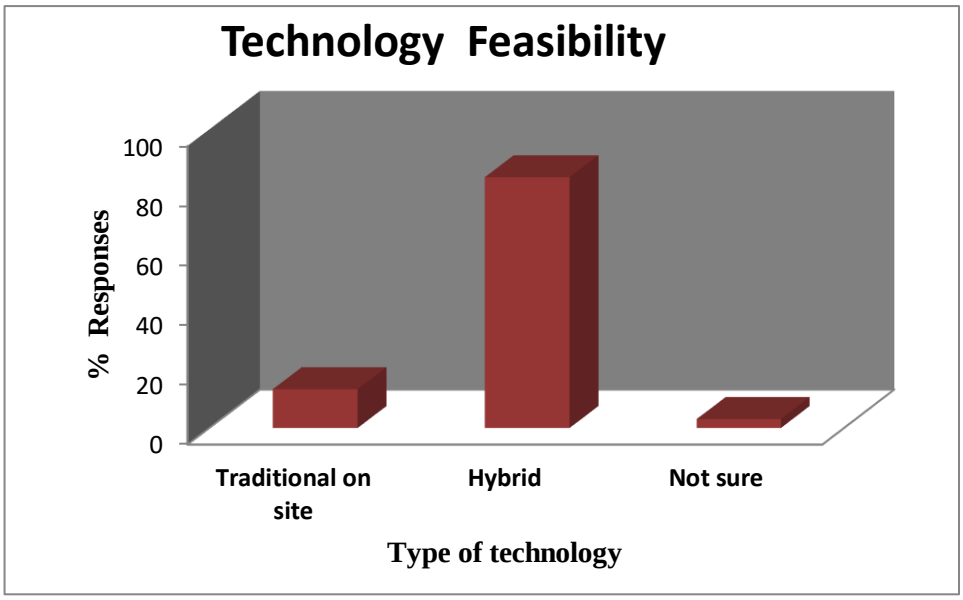

Figure 7. Feasibility of Using DCT

Figure 7 exhibits the feasibility of using clinical trials technologies. 13% respondents feels that traditional onsite treatment is feasible and 84% respondents thinks that hybrid mode of clinical trial i.e traditional and DCT is more feasible. 3% were not sure which technology is feasible. Physical examinations must be conducted on-site during visits to ensure effective safety monitoring. Engaging digitally illiterate patients (eg, the elderly) in DCT can be a challenge [19].

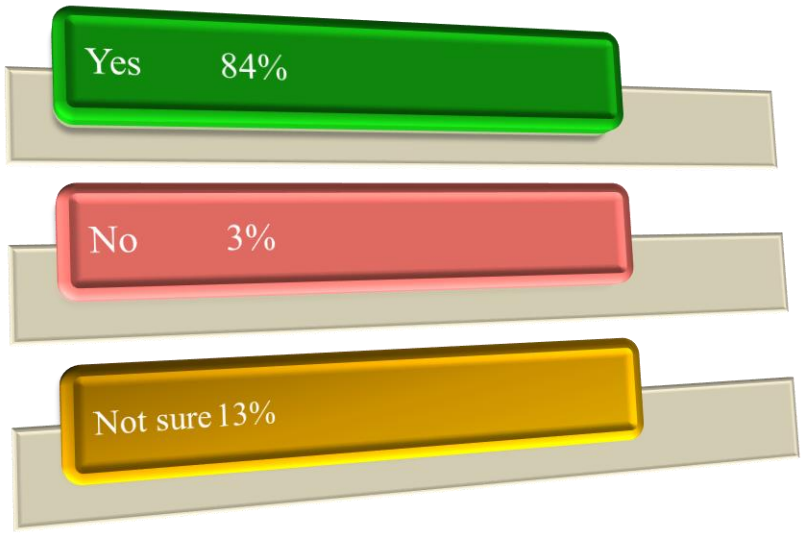

Figure 8. Promising Future of DCT in Clinical Trial

According to the survey results, 84% of the respondents expressed their acceptance that DCT has a promising future. The advantages of DCT are it removes the need for travel, which can make participation more difficult.

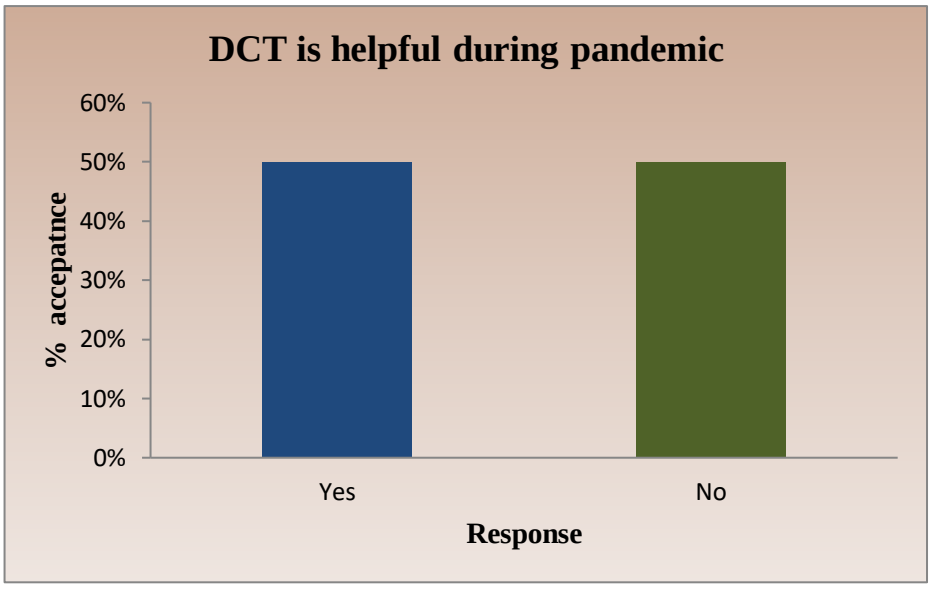

Figure 9. Adoption of DCT During Pandemic

The adoption of DCT before and during pandemic is depicted in Figure 10. In the conducted survey, half of the respondents (50%) answered yes, while the other half (50%) answered no. The pandemic has significantly accelerated the adoption of decentralized clinical trials, leading to a notable rise in remote trial activities conducted directly at participants' homes. Although certain aspects of decentralized trials were present before the pandemic, they were not widely utilized. The global health crisis has expedited the virtualization of both trial and consumer settings [20]. The pandemic of COVID-19 has a tremendous impact on the clinical research model. Patients who had previously participated in clinical trials were unable to access hospital trial sites for treatment and/or follow-up visits due to government travel restrictions or because they did not wish to attend for fear of infection.

During the pandemic, flexible DCT models are largely relied on to preserve patient continuity and to conduct studies for COVID-19 therapies and vaccinations. Pharmaceutical and biotechnology businesses are increasingly transitioning to flexible, digitally enabled trial methods, industry organisations are advocating for their usage, and regulators around the world look ready to investigating the potential benefits of digital technologies in clinical research. Following the pandemic, several RAs have expressed a desire to expand DCT techniques [21].

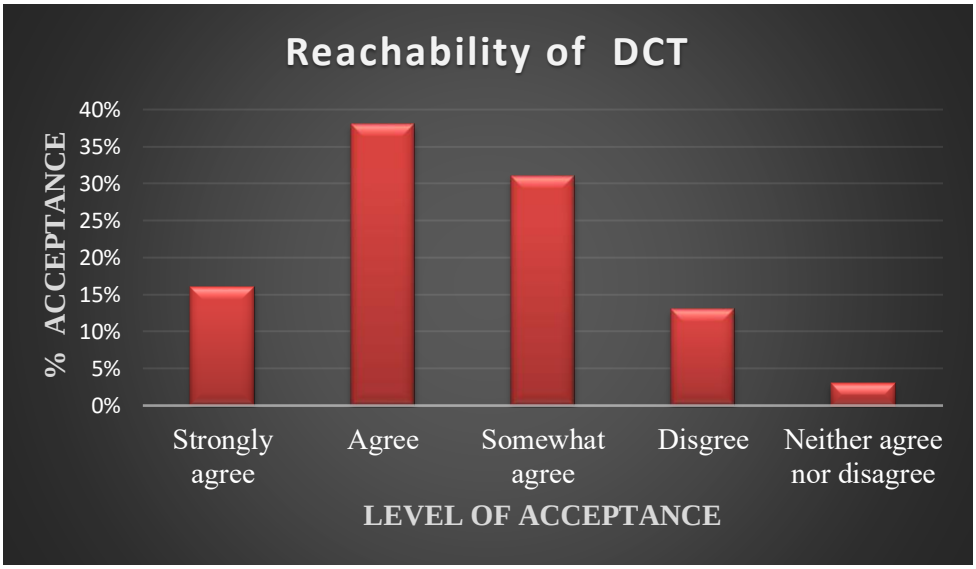

Figure 10. Reachability of DCT to Clinical Trial Participants

The view of respondents in reachability of DCT to clinical trial participants in short time is presented in Figure 10. In the survey conducted 38% respondents agreed that Clinical trial recruitment period is likely to improve as DCT is more reachable to Clinical trial Participant in a short time.15% strongly agreed that DCT is more reachable to clinical trial participants in short time. 31% somewhat agreed the question and 13% neither agree or disagree the view.

Based on Global Data's Clinical Trial Database, the count of decentralized clinical trials (DCT) has shown a consistent rise, from 250 trials in 2012 to 1,291 trials in the previous year. As of this year, there have been 950 trials conducted, and it is projected to reach approximately 1,425 trials by year-end. Notably, from 2012 to 2016, both industry and non-industry sponsors demonstrated comparable DCT usage. This survey also confirms that DCT has reached clinical trial participants in short time through the responses from clinical research professionals.

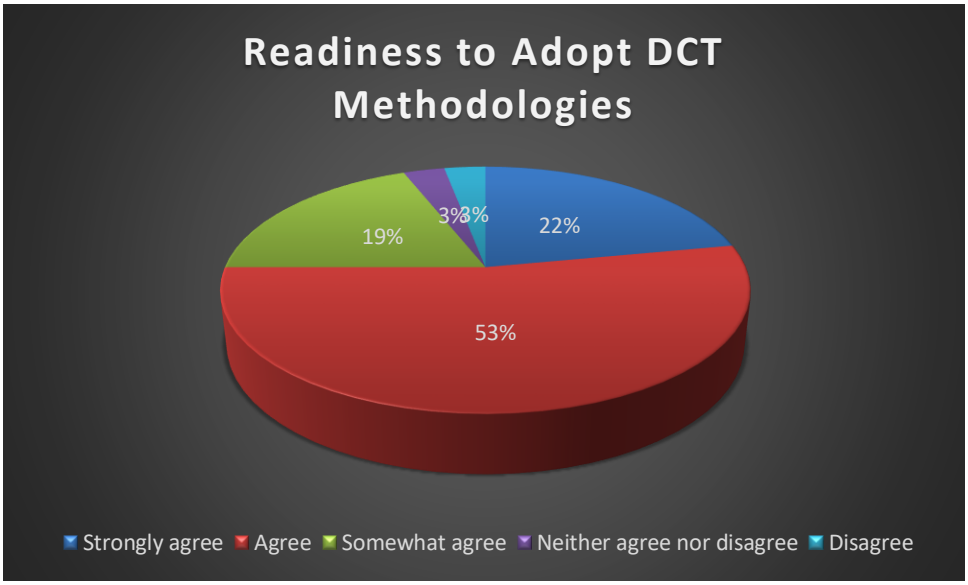

Figure 11. Readiness to Adopt DCT Methodologies

The percentage readiness to adopt DCT methodologies is depicted in figure 11. Around 3/ 4 th of the respondents are ready to adopt and use DCT methodologies. 22% somewhat agree, as respondents may want to try hybrid mode of clinical trial. 3% neither agree nor disagree and 3% disagree the statement. The survey results show that a significant proportion of participants are ready and open to adopting DCT methodologies. This positive response indicates a willingness to explore the potential benefits of DCT and suggests that the adoption of these methodologies may be well-received within the surveyed population.

Conclusion

The current study's findings give significant evidence that decentralised clinical trials offer a promising new strategy to clinical research, allowing for speedier, more efficient, and more flexible study designs. Their execution, on the other hand, necessitates careful consideration of data security, technology infrastructure, regulatory compliance, and participant involvement. DCTs are set to become an increasingly essential element of the clinical research landscape as digital technologies evolve and improve, providing new opportunities to enhance healthcare outcomes for all.

Conflict of Interest

The authors declare no conflict of Interest.

Acknowledgement

The authors acknowledge the clinical research professionals who participated in the survey.

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Investigation of Six (06) Cases of AFP Notified from Week 01 to 17 in the Health District of Kolondièba in Mali in 2023

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Abstract

Poliomyelitis is an infectious disease caused by the poliovirus and largely affects children under the age of 05. Our descriptive study concerned the analysis of suspected cases of poliomyelitis notified from week 01 to 17 in the health district of Kolondièba in 2023. During this period six (06) cases of AFP were notified by Community Health Centers (CHC) from Diaka (02 cases), Kolosso (01 case), Central (02 cases) and Fakola (01 case) case imported from the Ivory Coast in search of care. Their age range was 0-4 years and presented paralysis of the lower limbs for some and upper for others. Vaccination coverage with oral polio vaccine in the first quarter in Diaka and Kolosso was> 95%, on the other hand, Central and Kolosso had a rate <95%. The female gender accounted for 66.67% of cases with a sex ratio of 0.6. The attack rate was 8.91 cases per 100,000 inhabitants. Only three of the six (06) cases received at least three doses of vaccine. The risk factors were the uncontrolled migratory flow and the inaccessibility of health centers. The assessment of the living environment did not show any environmental risk factors. The survey made it possible to build the capacity of service providers on the surveillance of notifiable diseases, raise public awareness of risk factors, the declaration of children under 15 with paralysis regardless of the cause at the health center. and compliance with the vaccination schedule.

Keywords : *AFP, Mali, Poliomyelitis, investigation, vaccination.*

Introduction

Vaccine-preventable poliomyelitis or polio is a highly infectious viral disease that largely affects children under 5 years of age [1, 2]. The virus is transmitted from person to person mainly by fecal-oral transmission. Less frequently, it can be carried by an ordinary medium (for example, contaminated water or food) [1]. It multiplies in the intestine, from where it can invade the nervous system and cause paralysis. Most infected people show no symptoms, however less than 1% of infections result in irreversible paralysis [3].

In 1988, the World Health Assembly adopted a resolution calling for the global eradication of poliomyelitis, marking the creation of the Global Poliomyelitis Eradication Initiative (GPEI) led by national governments, WHO, Rotary International, the United States Centers for Disease Control and Prevention and UNICEF, later joined by the Bill and Melinda Gates Foundation and Gavi, the Vaccine Alliance [4].

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Cases due to wild poliovirus have decreased by more than 99% since 1988, from an estimated 350,000 cases in more than 125 endemic countries to 175 reported cases in 2019. Among the 3 strains of wild poliovirus (type 1, type 2, and type 3), wild poliovirus type 2 was eradicated in 1999 and no cases due to poliovirus type 3 have been observed since the last case reported in Nigeria in November 2012. These two strains have been officially recognized as being eradicated worldwide. In 2020, wild poliovirus type 1 is still circulating in two countries: Pakistan and Afghanistan [5].

In 2020-2021, cases due to circulating vaccine-derived polioviruses were reported in 31 countries,1,2, and Malawi reported one case of wild poliovirus type 1, with onset of paralysis in 2021, just over 1 year after the WHO African Region was certified Wild Polio Virus (WPV) [6].

In 2020, the COVID-19 pandemic disrupted polio immunization and disease surveillance activities in WHO regions; between January and September 2020, the number of reported AFP cases decreased and the time between the collection of stool samples and their receipt at the laboratory increased compared to the same period in 2019 [7].

Drawn from surveillance performance indicators for 2020 and 2021 of the 43 priority countries and thus updates previous reports. In 2021, a total of 32 (74%) priority countries achieved two key national surveillance performance indicator targets, which is an improvement from 2020 when only 23 (53%) achieved the targets. two objectives [8].

Since 2017, several genetically distinct Circulating Vaccine-Derived Poliovirus type 2 (cVDPV2) outbreaks continue to be reported in the Region. A total of 21 countries are affected by the ongoing cVDPV2, and outbreak response activities continue to be implemented in Angola, Benin, Burkina Faso, Cameroon, Central African Republic, Côte d'Ivoire, in the Democratic Republic of Congo, Ethiopia, Ghana, Guinea, Kenya, Liberia, Mali, Niger, Nigeria, Republic of Congo, Senegal, Sierra Leone, South Sudan and Chad, as well as in Togo [1].

In 2020, Mali did not detect any cases of poliovirus after the responses organized to counter the epidemics of Circulating vaccine-derived poliovirus type 2. However, in 2022, the country recorded 02 cases of polio from vaccine sources in the regions of Ménaka and Taoudénit [9].

However, significant national and sub-national gaps persist. Effective poliovirus surveillance is essential to track poliovirus transmission. Frequent monitoring of surveillance indicators could help identify gaps, guide improvements, and enhance the overall sensitivity and timeliness of poliovirus detection to achieve polio eradication [8].

Surveillance by a network of laboratories capable of determining the viral origin of cases of acute flaccid paralysis (AFP) is one of the four strategies recommended by WHO for the eradication of poliomyelitis [10, 11], the documentation of all cases of acute flaccid paralysis (AFP) are very important for the eradication of poliomyelitis [12].

Thus, thanks to the weekly update of the rapid documentary review of the poliomyelitis surveillance system in Mali showed a high rate of case notification by the regions (6/10 or 60%) in addition to the district of Bamako [13].

In 2023, in the Kolondièba district during the first 17 epidemiological weeks, 06 suspected cases of acute flaccid paralysis were recorded in the health structures as follows: Diaka (2 cases: week 6) Kolondièba Central (2 cases: week 17), Kolosso (1 case: week 11) and Fakola (1 case: week 8), all were sampled and the samples sent to the national reference laboratory of the National Institute of Public Health for confirmation.

Our descriptive cross-sectional study consists of an analysis in time, place, and person and of risk factors, vaccination status, notions of travel of suspected cases of

poliomyelitis notified from week 01 to 17 in the Kolondièba health district in 2023.

The objective of this study is to elucidate this situation and to contribute to the strengthening of the epidemiological surveillance of Acute Flaccid Paralysis in the said district.

Methodology

Study Area

The investigation took place from April 26 to May 3, 2023, in the Kolondièba central, Kolosso and Fakola health areas in the Kolondièba health district in Mali.

The Kolondièba district has 24 health areas and 86 Community Health Agents (CHW) sites with a total population of 312,964 inhabitants, of which 67,287 are in the 0-4 age group, it is limited to the north by the district of Bougouni, in the south the republic of the ivory coast and the Kadiolo health district, in the west by that of Sikasso.

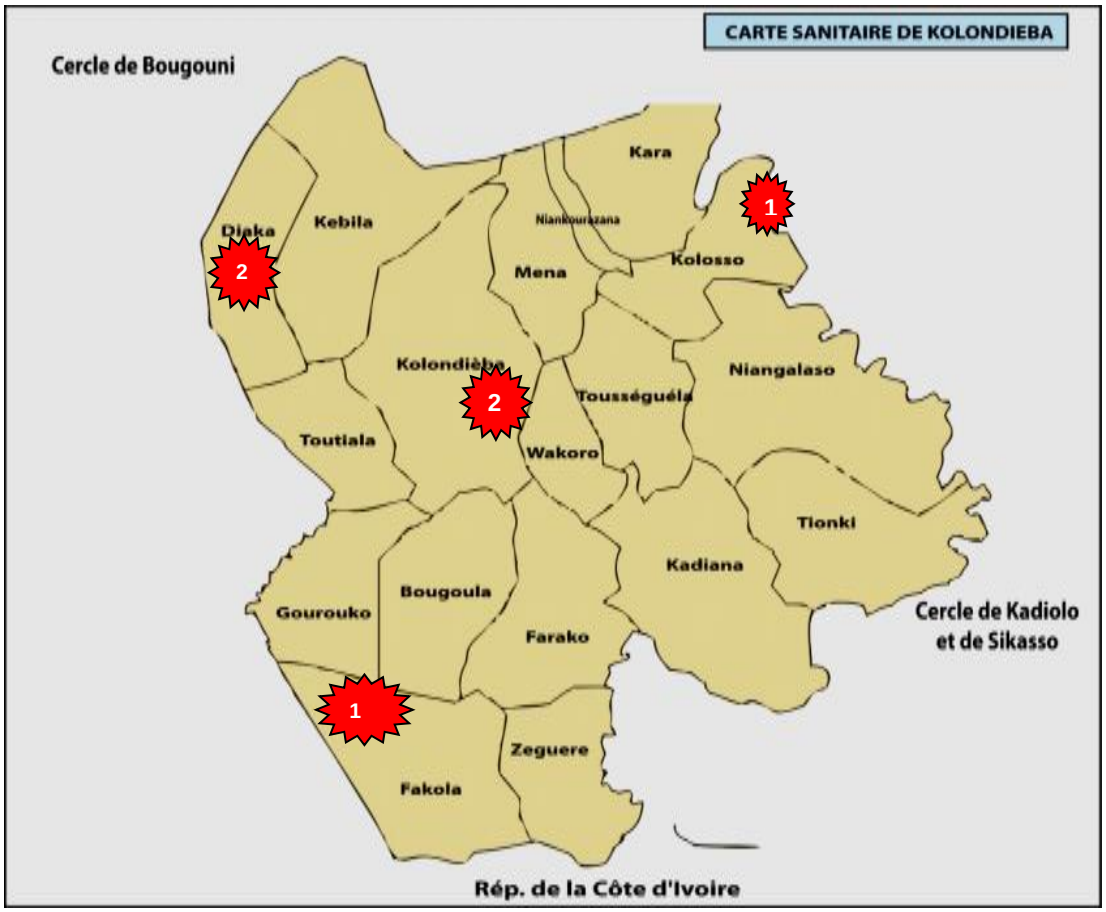

Figure 1. Health Map of Kolondièba

Investigation Implementation Process

Acute Flaccid Paralysis Standard Case Definition (AFP)

Any child under the age of 15 with Acute Flaccid Paralysis (AFP) or any person suffering from paralysis, regardless of age, in whom the doctor suspects poliomyelitis [14].

Acute Flaccid Paralysis Operational Case Definition (AFP)

Any child under 15 who was crawling or walking and suddenly no longer crawling or walking Or Weakness of one or more limbs occurring in the last 6 months whatever the cause and having stayed in the village for the last 30 days before the onset of paralysis or weakness [15].

Inadequate Acute Flaccid Paralysis (AFP)

Any case of Acute Flaccid Paralysis (AFP) in whom:

1. One or both stool specimens were collected beyond 14 days.
2. Samples collected less than 24 hours or more than 48 hours.
3. A single stool sample taken.
4. Notification without sample collection.
5. Insufficient stool collection (less than 8 to 10 grams).
6. The sample arrived at the laboratory in poor condition.
7. Poor quality of the investigation sheet.

Contact Subject

Any child under the age of 5 who lives in the same household or, failing that, the household closest to the home with an inadequate case of Acute Flaccid Paralysis. Three (03) contact cases to be sampled around each inadequate case with 1 stool per contact case.

Compatible Case

Any case of Acute Flaccid Paralysis with inadequate stool specimen and negative lab result with:

1. Residual paralysis was found on follow-up examination with no other obvious cause.
2. Any case that has not benefited from a follow-up examination (more than 90 days, lost to sight or died.

Hot Case of Acute Flaccid Paralysis (AFP)

Case of Acute Flaccid Paralysis (AFP) likely to be a case of paralysis due to Wild Polio Virus either on the basis of a clinical examination (age: Child under 5 years old, fever at onset, sudden paralysis, of rapid and asymmetric progression, zero dose or insufficiently vaccinated (less than 03 doses) and/or a case of Acute Flaccid Paralysis (AFP) having had direct contact with a confirmed case of Wild Polio Virus, this pending the reference laboratory results [16].

Silent Health District

Any Health District which has not notified any case of Acute Flaccid Paralysis since the beginning of the year until the monitoring period.

Data Collection Techniques and Tools

The collection technique of the survey consisted of direct interviews by administering a questionnaire to the parents of patients and health professionals in these localities, documentary review and observation. The documentary exploitation was made using the following tools (the consultation registers, the linear lists of cases, the weekly reports of the cases, the notebooks of disease with obligatory declaration and the sheets of investigation of the cases), sheet of analysis of the cases and the interview questionnaire.

Data Analysis

Data processing and analysis were done with Excel and Word software. This analysis focused on the variables: age, sex, place of residence, vaccination status, medical history, concept of travel and stay and on the risks of exposure as well as the assessment of the living environment. In addition, control actions have been carried out.

Results

Description of Case Trends Over Time

Origin of Cases

These are 06 children in the age group of 0-4 years of both sexes (male, female), from:

1. CHC Diaka: 1 case from the village of Diaka and the other from Degoro-foungalo
2. CHC Central: 2 cases both come from the city of Kolondièba.
3. CHC Kolosso: the only case comes from the village of Kolosso.
4. CHC Fakola: the case comes from Ouéli in Côte d'Ivoire.

The onset of the disease of the first cases dates to 02/15/2023 in the health area of Fakola. Other cases were declared successively in Kolondièba center on March 14, 2023, and in Kolosso on March 19, 2023. Adequate stool samples from the 06 suspected cases were taken within 24-72 hours of notification and sent to the laboratory for confirmation.

The survey of the living environment (use of latrines), which despite everything is a rural area, did not detect any anomaly or risk factors for the other children, however regular hand washing is not effective.

Evolution of Cases and Deaths

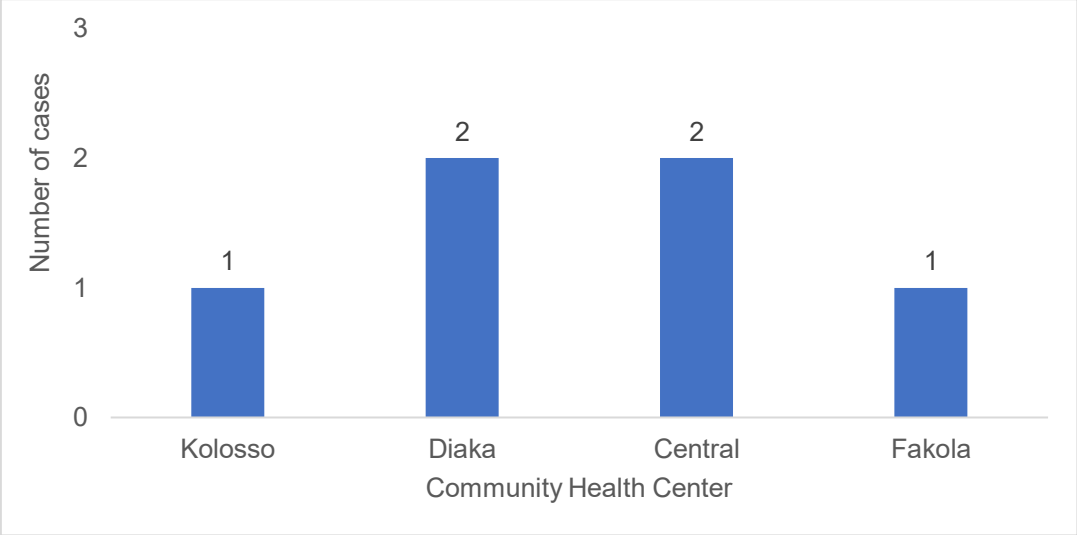

Figure 2. Distribution of AFP Cases by CHC from Week 1 to 17 in the District of Kolondièba in Mali in 2023

Cases of Acute Flaccid Paralysis (AFP) were recorded in 4 health facilities out of 24 in the district. Also, all the cases were investigated, notified, sampled, and forwarded within 24 hours to the higher level. This demonstrates compliance with the performance standards as defined (notification time <7 days, investigation <24-48 hours and delivery of samples <72 hours).

During the period, two peaks were recorded, one in week 06 and the other in week 17.

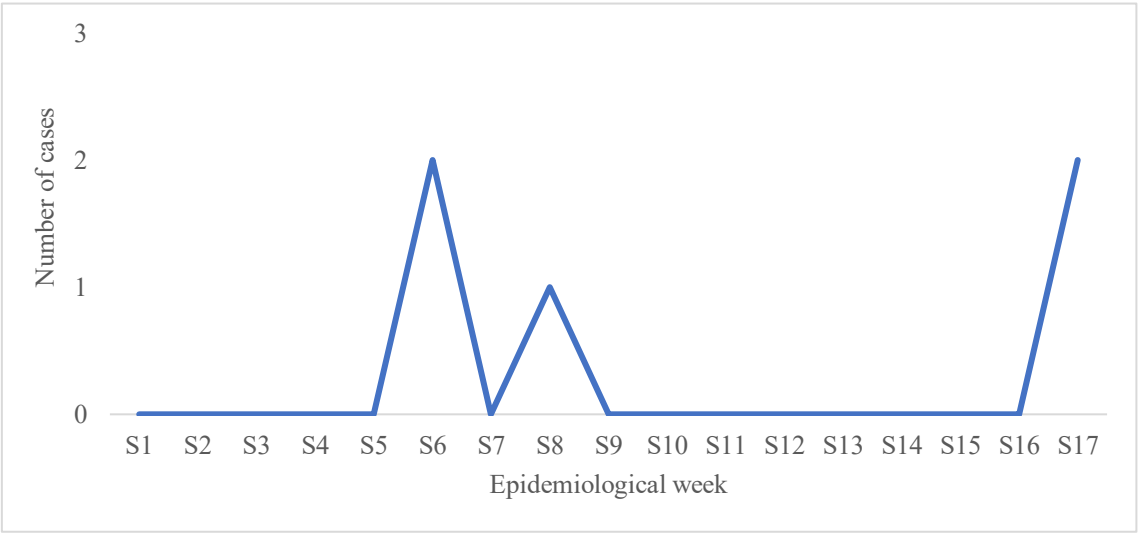

Figure 3. Evolutionary Curves of Suspected Cases of Acute Flaccid Paralysis (AFP) in Kolondièba from Week 1 to 17 of 2023

Individual Case Characteristics

The female sex recorded the most cases with a sex ratio of 0.6.

It should be noted that all the ages represented are those of the age group of the Expanded Routine Immunization Program 0-4 years.

Table 1. Description of Cases by Sex from Week 1 to 17 in the Kolondièba Health District in Mali in 2023

Sex	***Number of cases (N=6)***	***Percentage (%)***
Male	2	33.33
Feminine	4	66.67

Table 2. Description of Cases by Age from Week 1 to 17 in the Kolondièba District, Mali in 2023

Age range	**Population 0-4 years (67287 hbts)**	**Number of cases (N=6)**	**Attack rate for 0-4 age group (100,000 hbts)**
≤1 mois	67,287	2	8.91
2 ans		1	
3 ans		3	

Source population 0-4 years Mali DHIS2 (67,287 inhabitants)

Migration and Routing of Cases

Among the 06 cases, only one case left the neighboring country of Côte d'Ivoire (Ouéli) for Fakola in search of care, all the others have no concept of travel.

Table 3. Description of Cases According to Vaccination Status of Cases from Week 1 to 17 in the District of Kolondièba in Mali in 2023

Notifying health center	***Socio-demographic variables***		***Vaccination status***			
	Age	Sex	1 scoop	2 doses	3 doses	4 doses
Diaka	2 years	M	X	X	X	X
	3 years	F	X	X	X	X
Central	3 years	M	X	X	None	None
	3 years	F	X	X	X	None
Kolosso	1 day	F	X	None	None	None
Fakola	1 month	F	None	None	None	None

It is noted that out of all the six (06 cases) only 3 among them received at least three doses of vaccine against poliomyelitis.

The Oral Polio Vaccine third dose (OPV3) vaccination coverage rate of these Community Health Centers (CHC) during the first quarter is as follows: Diaka 102.8%> 95%; Fakola 452.9% > 95% this rate of vaccination coverage more than 100% may be due to migratory flows and to the underestimation of the target population and children outside vaccinated areas. However, Central (75% < 95%) and Kolosso (82.7 < 95%) did not reach the vaccination coverage performance rate of> 95%.

Identification of Risk Factors

The risk factors are the porosity of the borders with neighboring countries which makes health checks difficult, but also the uncontrolled migratory flow and the inaccessibility of the healthcare centre. Furthermore, the survey of the living

environment did not reveal any environmental risk factor for the other children.

Assessment of Case Management

1. The central cases were recognized as malnourished and were therefore taken care of by the Recovery and Intensive Nutritional Education Unit of the Reference Health Center of Kolondièba, this care contributed to the improvement of the paralytic state of the cases.
2. For the cases of Fakola and Diaka, they were administered an analgesic (paracetamol), the care allowed a physical improvement of the cases.
3. That of Kolosso, meanwhile, was taken care of for a brachial plexus. The child before his release had a more stable evolution than when he was admitted.

Control Actions

This investigation trip made it possible to raise public awareness of the merits of vaccination, the declaration to the nearest health center of any case of paralysis whatever the cause, compliance with the vaccination schedule and the use of health center for any limb weakness in a child under 15 years of age. In addition, sensitizations have been made to the population on the risks of lifelong disability because of poliomyelitis in unvaccinated children.

Discussions

The results of the investigation show that the reported cases meet the case definition of acute flaccid paralysis as recommended by the WHO. All six (06) are from the 0-4 age bracket almost like the results of the Ivory Coast [7], Nigeria [17], India [18], Hamadan in Iran [19], Italy [20] and Lebanon [21] who found that children under 5 accounted for the most cases. The sex ratio was 0.6 lower than those of the Ivory Coast 1.3 [7].

As for the level of protection, only 60% of children had received at least a dose, results higher than the 53.8% stated in Côte d'Ivoire in 2015 [7], yet lower than the 70.07% reported in Guinea [6] and Nigeria (98.3 %) [22], hence the need to strengthen the expanded immunization program in health facilities in the district.

In addition, 100% of cases had two stool samples taken and sent to the laboratory within 14 days, results higher than 96.14% of cases reported in Guinea [6] and Spain (72.5%) [23], and different from those found in South Africa (53.0%) [24]. As in our study, cases of non-polio flaccid paralysis are more numerous because the definition has become more sensitive [8].

The results of this report are subject to at least three limitations. First, security issues and hard-to-reach populations may affect Acute Flaccid Paralysis (AFP) surveillance and limit the interpretation of surveillance indicators. Second, high rates of Acute Flaccid Paralysis without poliomyelitis do not necessarily imply very sensitive surveillance, as not all reported cases of Acute Flaccid Paralysis may not meet the case definition, some actual cases of Acute Flaccid Paralysis may not be detected, and background Non-Polio Flaccid Paralysis rates may vary. Finally, the quality of the adequacy of the stool sample depends on the ability of the field interviewer to accurately obtain the date of paralysis onset. Quality surveillance is essential to achieve the goal of global polio eradication and rapid and effective detection, reporting, and investigation of cases of Acute Flaccid Paralysis. This also includes specimen transport and laboratory testing. Frequent monitoring of surveillance indicators can help identify gaps, guide decisions, and improve the quality of surveillance.

While waiting for the confirmation results of these cases from the sensitization sessions on the Expanded Vaccination Program, the risk factors and sequelae of the disease must also be reinforced for the populations.

Recommendations

Table 4. Recommendations

Recommendations	Responsible
Train community traditional healers in the district on Acute Flaccid Paralysis (AFP)	Chief doctor
Strengthen community surveillance of Notifiable Diseases.	Center Technical Director / Community Health Worker (CHW)
Strengthen the active search for cases of Acute Flaccid Paralysis.	Center Technical Director / Community Health Worker (CHW)
Sensitize communities on the importance of vaccination and compliance with the vaccination schedule	Community Health Worker (CHW)
Strengthen routine immunization.	Vaccinator Agent
Find those lost to follow-up by involving community leaders	Center Technical Director / Vaccinator Agent / Community Health Worker (CHW)
Establish a framework for regular consultation between the district of Kolondièba and those of the neighboring country with which it shares borders	Chief doctor
Advocate for improved security to strengthen access to care	Actors in charge of security
Strengthen the active and passive search for cases of Acute Flaccid Paralysis (AFP) by involving relays, community leaders and traditional healers	Center Technical Director

Conflict of Interest

All authors and co-authors declare that they have no conflict of interest in the work presented.

Conclusion

The investigation allowed us to note that the cases notified by the health facilities of the Kolondièba district respond to suspected cases of Acute Flaccid Paralysis (AFP) as defined in the context of epidemiological surveillance. Risk factors related to the vaccination coverage of children have been identified. To deal with this situation, recommendations have been formulated both for health workers and for the community.

Acknowledgement

Doctor Seydou FOMBA; General Directorate of Health and Public Hygiene of Mali; Regional Health Directorate of Koulikoro and Sikasso in Mali, the chief medical officers, and the community-based surveillance focal points of the districts of Kadiolo, Kati and Kangaba, the technical directors of the health centers and the health worker district community.

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Characteristics and Management of Parasuicides at a Tertiary Hospital in Gaborone: A Retrospective Study at the Emergency Department of Princess Marina Hospital

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Abstract

Parasuicide has become one of the major public health problems worldwide. The WHO is estimated that for every suicide that occurs worldwide, there are up to 20 suicide attempts; however reliable data are not available for most countries. Furthermore, much less is known about attempted suicide across the African continent. Therefore, it was opportune to conduct such project which will provide some valuable statistics on Parasuicide in Botswana. The major objective is to establish the characteristics of Parasuicide at the Princess Marina hospital. Therefore, a retrospective descriptive design (188 patients with Parasuicide) was conducted at the emergency room (January - December 2015). The prevalence of parasuicide is estimated at 0.88%. Overall, females are predominant (79.7%). The age group 21-30 is predominant, mostly students. The factors influencing parasuicide are passional conflict (30.8%), family conflict (20.7%), and social problems (7.9%). Toxic agents (88.2%) were largely used, mostly by females. Among the toxic agents, pharmaceuticals (68.62%) and chemicals (17.55%) were predominant. The overall outcome is largely good (98%). Although patients were widely managed by internal medicine (75.53%), a multidisciplinary approach was established in 10.64% of cases. The study demonstrates that there was no correlation between waiting time, the code of severity and the outcome, as well as the deranged blood and the outcome. In conclusion, Characteristics, and management of Parasuicide were studied. The findings are above described. Further studies may be necessary to elaborate different parameters of parasuicide.

Keywords: *Characteristics of parasuicide, Management of parasuicide, Parasuicide, Princess Marina Hospital.*

Introduction

Parasuicide has become one of the major public health problems worldwide [1, 2]. Despite the limited number of studies conducted in Botswana on this topic, Parasuicide has been shown to be a public health problem (princess marina hospital record, 2014).

Studies around the world have mainly focused on suicide though they have a parasuicide component. Globally, suicide represents a significant and complex public health problem. It is estimated that over a million suicides occur every year. The real figure is believed to be higher than this estimate due to underreporting in many parts of the world.

Similarly, the estimated number of non-fatal self-inflicted injuries (parasuicide) is twenty times higher than the number of reported deaths due to suicide [3].

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In Botswana, suicide cases have been reported as well. A study was conducted in two urban and two rural areas. This study attempted to highlight factors associated with suicide. The sample size was 100 participants. In this study, the factors associated with suicide and suicide attempt were mental illness (31%) and alcohol abuse (69%).

Similarly, out of 100 study participants, 45 were attempters (parasuicide) and 55 were completers (suicide). Likewise,78% were male and 22% were female. Based on the sociodemographic factors, the study also found that, on one hand, women are more suicide attempters than men, and on the other hand, men are more suicide completers than female. In both males and females, complete suicides were more likely above the age of 20 [4].

Of the cases attended at the accident and emergency in princess marina hospital, about 2% are parasuicide. Yet no study has been conducted. Hence the need for this study.

The purpose of this study is to determine the patterns and characteristics of parasuicide tendencies in patients presenting at the accident and emergency department of the Princess Marina Hospital.

Each year, the World Health Organization (WHO) estimates that almost a million people die from suicide worldwide, highlighting suicide as a serious global public health concern.

It is estimated that for every suicide that occurs worldwide, there are up to 20 suicide attempts; however reliable data are not available for most countries. Furthermore, much less is known about attempted suicide across the African continent [5].

Although there is limited data in most African countries in general and in Botswana in particular, there are data suggesting that parasuicide is a significant problem in Botswana. Some estimates show that over 30% of adolescent admissions to the referral hospital are due to parasuicide (Paul Sonenthal, 2010).

In a pilot study conducted at the accident and emergency department of the Princess Marina hospital from the 20th to 27th November 2016, 8861 patients were seen. Of these, 144 (1.6%) were parasuicide patients. Furthermore, 60% of these parasuicide patients were female with the majority being adolescents (15 – 25 yrs). It was also found that most agents used in parasuicide were medications (over the counter drugs or daily drugs for chronic disease). The most prevalent risk factor for parasuicide was found to be social conflict (partnership and family issues) (princess marina hospital medical record, 2016).

Based on this finding, it is opportune to conduct a study which will provide some valuable statistics. These statistics will provide preliminary data for future research on parasuicide.

There is a dearth of knowledge with respect to parasuicide first in Africa in general and second in Botswana in particular. However, there is increasing evidence of parasuicide events in different hospitals in Botswana [3, 6]. Hence this study is conducted to fill the existing gap regarding knowledge of parasuicide in Botswana.

The aim of this study is to determine the characteristics of parasuicide based on the patients who attended the accident and emergency department at the Princess Marina hospital.

1. To describe the epidemiological patterns of parasuicide at princess marina hospital.
2. To describe different agents or methods involved in parasuicide.
3. To establish the level of urgency of parasuicide at princess marina hospital and its impact on the management of this condition.
4. To determine the outcome following a parasuicide.

Research Design and Methodology

Study Setting

The study was conducted at the accident and emergency (A&E) of Princess Marina hospital. Princess Marina Hospital is one of the two public, referral hospitals catering for the entire southern part of the Country. Princess Marina hospital is situated in Gaborone, the capital city of the Republic of Botswana.

The accident and emergency department is one of the units of the Hospital. It is the major entrance to the hospital. It is situated by the entrance of the hospital with an emergency gate, opposite the transport office for ambulances. The accident and emergency department is divided into different sections and offices including Head of department office, Triage room, Patient Waiting area, Family waiting area, Bays (1 to 10) and corridors (1 to 7), Resuscitation room, Side laboratory, Kitchen, Sister in charge office, Storeroom, Disaster room, Doctors station, Nurse's station, Health care auxiliary's station, Isolation room.

The Accident and emergency department has the mandate to manage and stabilize efficiently and effectively trauma and critically ill patients. During 2015, about 28000 patients attended accidents and emergencies for various reasons. The patients are either referred from different health facilities or self-referred from home.

Study Population and Duration

All patients who attended the accident and emergency department between 1 January 2015 and 31 December 2015, with the history of parasuicide and/or drug overdose in the background of attempted suicide were eligible to be enrolled in the study. Below are the inclusion and exclusion criteria.

Inclusion Criteria

1. Patients who attended accident and emergency department at princess marina hospital.
2. Patients with a diagnosis of parasuicide on admission at the Emergency Department from January to December 2015.
3. Patients with an initial diagnosis of drug overdose with a history of attempted suicide will be included in the study.

Exclusion Criteria

1. Patients from other hospitals.
2. Patients with known psychotic conditions (e.g., bipolar disorder).
3. Any unclear record (s).
4. Any record (s) with missing data.
5. Any record (s) without the hospital record number (PM/PA)

Study Design

This is a retrospective descriptive study of medical record of parasuicide patients at princess marina hospital over a one year period covering January 2015 to December 2015. A retrospective study is defined as a research design that is used to test etiologic hypotheses in which inferences about exposure to the putative causal factors are derived from data relating to characteristics of persons under study or to events or experiences in their past [7].

The retrospective design has multiple advantages including, but not limited to, less expensive and less time to complete than other designs yet yielding equally important information. It has a disadvantage of generating biases (selection bias, recall bias, misclassification, and information bias).

Sampling Method

A simple random sampling was performed. A random sample is one which is arrived at by selecting sample units such that each possible unit has a fixed and determinate probability of selection [7].

The investigator looked at records of patients who attended the accident and emergency department of princess marina hospital. Following that, all records of patients with

parasuicide and/or drug overdose with the background of suicidal attempt were identified.

Sample Size, Statistical Power, and Level of Significance

Taking into account that type I error is estimated at 5% (P value) and type II error is estimated at 80%, with a standard deviation at 5.6 (M. A. Suleiman & al, 1986); the sample size in our study is 188.

The sample above was calculated based on the following formula.

$$\textbf{Sample Size} = \frac{\left(Z_{1-a\backslash 2}\right)^2 XSD^2}{d^2}$$

$Z_{1-a/2}$ represents the standard normal variation (at 5% type 1 error with P value less 0.05). It is equal to 1.96.

SD stands for standard deviation. Estimation from a previous study done in Kuwait.

d is the absolute error or precision representing the power of the study.

Assessment and Measurements

The following variables were included in the study:

1. Sociodemographic factors (age, gender, occupation, marital status, employment, student, relationship problems).
2. Medical intervention at A&E (medication and investigation, dispatch, referral, further management).
3. Method of parasuicide (toxic agents, others).
4. Outcome attributes (presence or occurrence of complications).

Data Collection and Statistical Analysis

Data Extraction

Data extraction has been conducted by the investigator using a Microsoft excel spreadsheet. The data extraction started by physical search of the triage form of parasuicide cases over the 1 year period. A total of 247 patients had a diagnosis of parasuicide; out of which, 23 were discarded due to lack of adequate information (14 missing medical record number,2 with wrong medical record number, 6 known psychiatric patients, 1 missing gender and age). The remaining 224 cases were all eligible to be enrolled as participant into the study. Each participant was given a number from 1 to 224. Random number generators were used to come up with the required sample size of 188. Upon identification of the 188 patients (sample size), the PA/PM number of the selected patients were used to trace the blood results of these patients in the IPMS.

Data Analysis

Descriptive Analysis

The distribution of each variable was examined and presented in tabular form and graphs followed by statistical analysis. Measures of central tendency (mean, median and mode) and measures of spread (range, interquartile range, and standard deviation) were studied to explore the socio-demographic and clinical characteristics of patients, the methods used to commit parasuicide as well as the outcome. The record and analysis of the data were done using SPSS 16.

Inferential Analysis

Inferential statistics were used to establish the relationship between variables in the data sets including but not limited to, the relationship between age and triggering factors, gender and triggering factors or gender and method used for parasuicide.

Ethical Considerations

The purpose of these ethical considerations is to promote the aims of research such as knowledge, truth, and avoidance of errors as well as a variety of other important moral and social values, such as social responsibility and human rights.

Due to its retrospective nature, this descriptive study will not directly enroll any human subject. To ensure the confidentiality,

some measures were taken into considerations as follows:

1. Data were coded, kept anonymous and used only for research purposes.
2. No patients were directly in contact with the principal investigator and the research team.
3. Data were kept in a secure and locked computer held only by the principal investigator. Only the research team had access to the file on the computer.
4. At the end of the data analysis and interpretation, the primary tool of data collection was deleted from the system.

Observations and Findings of The Study

The accident and emergency department of princess marina hospital admitted a total of 28000 patients in 2015, among which 247 was diagnosed with parasuicide. This represented 0.88% of patients who attended the ED. Only 188 patients were eligible and enrolled in the study. Following are different findings of the study.

Table 1. Showing Gender Distribution among Parasuicide Cases Registered at the Accident and Emergency of PMH Of the Study Population, 79.79% of patients were Females while Males Represent 20.21%

Gender	Freq.	Percent	Cum.
1	150	79.79	79.79
2	38	20.21	100.00
Total	188	100.00	-

Legend: 1: female; 2: male

In the study population, almost half of the patients were between 20 and 30 years old (46.81%), followed by 36.17% of teenager. The tendency of parasuicide decreases as the population is getting older. However, only 0.53% attempted suicide amongst the age groups of 51-60 years and 61-70years old.

Table 2. Showing Age Distribution among Parasuicide Cases Registered at the A&E of PMH

Agecat2	Freq.	Percent	Cum.
20	68	36.17	36.17
30	88	46.81	82.98
40	23	12.23	95.21
50	7	3.72	98.94
60	1	0.53	99.47
70	1	0.53	100.00
Total	188	100.00	-

Legend: age group; 20: < or = 20 years; 30: 21 – 30 years; 40: 31 – 40 years; 50: 41 – 50 years; 60: 51 – 60 years; 70: 61 – 70 years

The data implies that the density of predictive age of Parasuicides is maximal on the young adult and teenagers.

Figure 2 shows that the frequency of parasuicide is maximal at age 20.

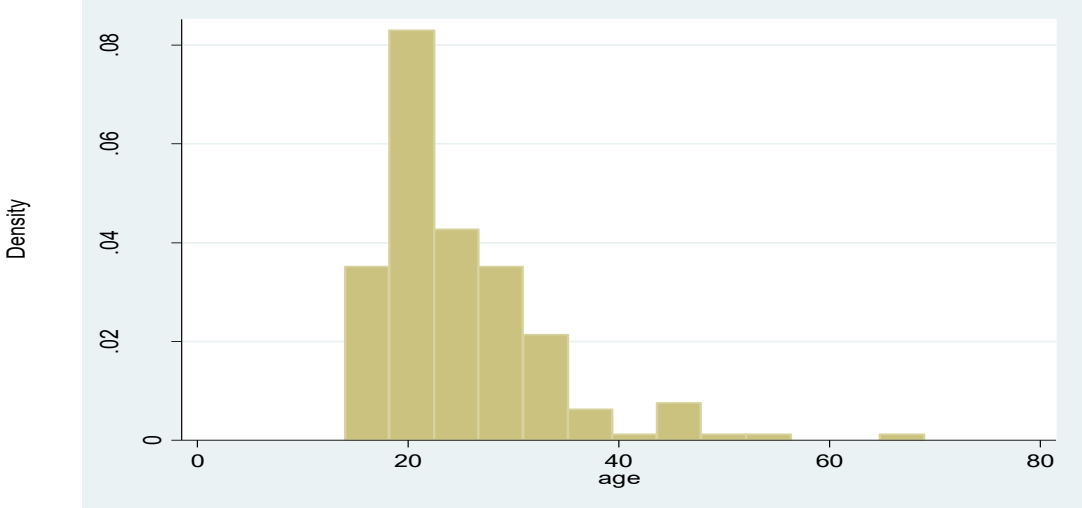

Figure 1. Showing the Density of Age among Parasuicide Cases Registered at A&E of PMH

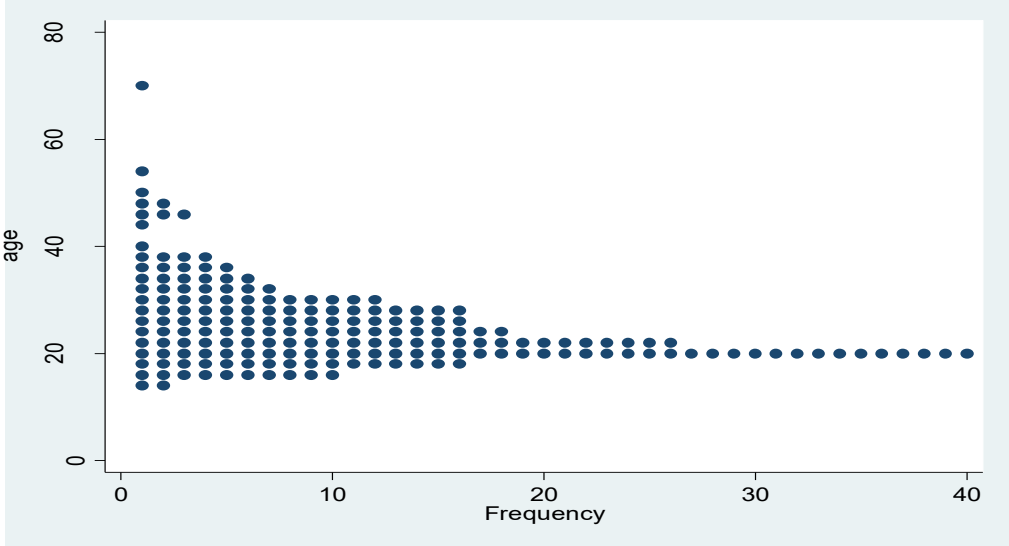

Figure 2. Showing the Age-Frequency of Parasuicide Cases Registered at the A&E of PMH

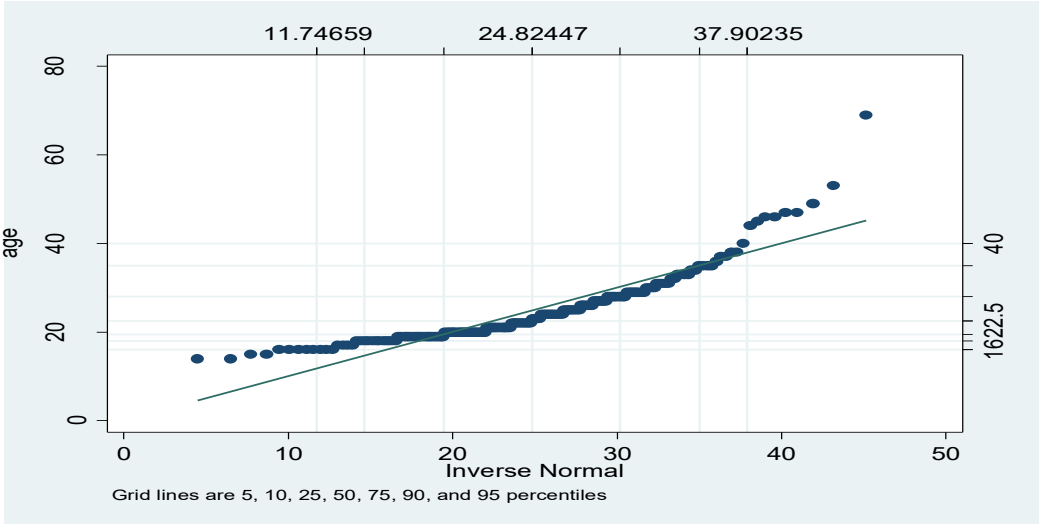

Figure 3. Showing the Age Progression of Parasuicide Cases Admitted at the A&E of Princess Marina Hospital

Table 3. Showing Gender Distribution by Age Category among Parasuicide Cases Registered at the Accident and Emergency of PMH

Agecat2	1	2	Total
20	59	9	68
30	72	16	88
40	15	8	23
50	3	4	7
60	0	1	1
70	1	0	1
Total	150	38	188

Legend: Age group(agecat): 20: < or = 20 years; 30: 21 – 30 years; 40: 31 – 40 years; 50: 41 – 50 years; 60: 51 – 60 years; 70: 61 – 70 years; Gender: 1. female; 2. Male.

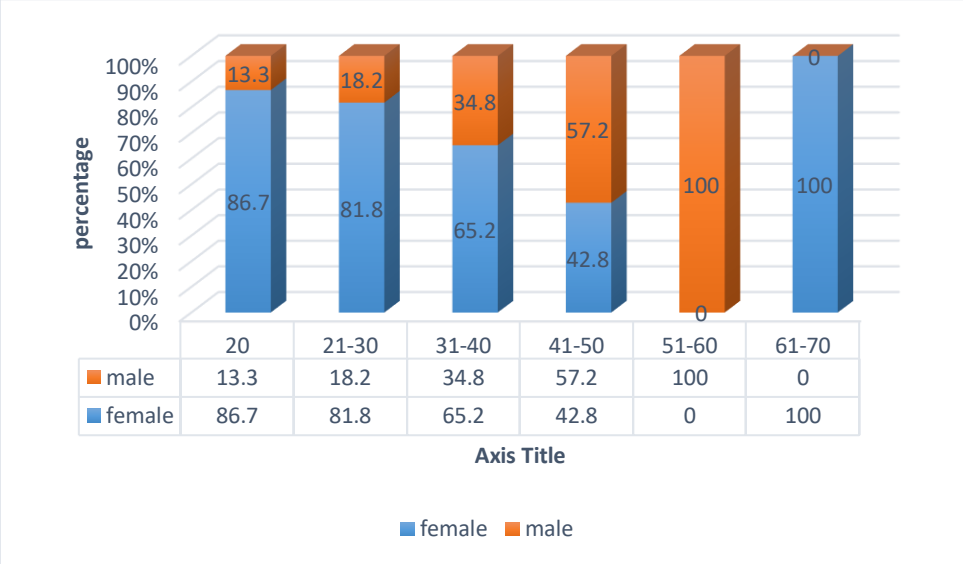

Figure 4. Showing Percentage of Gender Distribution by Age Category among Parasuicide Cases

Table 4 and figure 4 show the predominance of female in the peak-age group 21-30 years (81.8% female versus 18.2% male). Females are also predominant among teenagers (age group below 20 years) with86.7% against 13.3% of males. Males have the lead on the age category 41-50.

Table 4. Showing Patients' Distribution Based on the Gender and Occupation Status among Parasuicide Cases Registered at the Accident and Emergency of PMH

	Unemployed	Student	Employed	Unknown	Total
Female	24 (72.7%)	71 (85.54%)	4 (66.66%)	51 (72.7%)	**150**
Male	9 (27.3%)	12 (14.46%)	2 (33.34%)	15 (17.3%)	**38**
Total	**33 (17.55%)**	**83 (44.15%)**	**6 (3.19%)**	**66 (35.11%)**	**188**

The majority of patients were students (44.15%). Among the students, 85.54% were females and 14.46% were males. Following the group of students, there is a considerable number of patients without unknown employment status (35.11%). 72.7% of them were female and 17.3% were males. And then 17.55% of patients were unemployed among which 72.7% were females and 27.3% were males. Only 3.19% were employed, predominantly females (66.66% v 33.34%). In all group females were predominant.

Table 5. Showing Influencing Factors by Gender among Parasuicide Cases Registered at the Accident and Emergency of PMH

	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**
Female	44(78.5%)	12 (80%)	32(82.0%)	4882.5%)	3(75%)	1(100%)	6(85.7%)	1(100%)	3(100%)	**150**
Male	16(21.5%)	3(20%)	7(18.0%)	10(17.5%)	1(25%)	0(0%)	1(14.3%)	0(0%)	0(0%)	**38**
total	**60(31.9%)**	**15(7.9%)**	**39(20.7%)**	**58(30.8%)**	**4(2.1%)**	**1(0.5%)**	**7(3.7%)**	**1(0.5%)**	**3(1.6%)**	**188**

Legend: Influencing factors: 0= unknown; 1= social problems; 2= family conflict; 3= passional conflict; 4= school's problem; 5= illness (self or close relative); 6= unexplained stress; 7= refusal of disclose;8= combination of 2 or more problems.

Table 7 shows that the influencing factor was not known in 31.9% of cases. There are 30.8% of passional conflict, 20.7% of family conflict, and 7.9% of social problems. 3.7% of patients refuse to disclose the triggering factors.

67.02% of patients in the sample data were referred from local clinic. 10.11% were self-referred followed by 9.57% of brought by EMS.

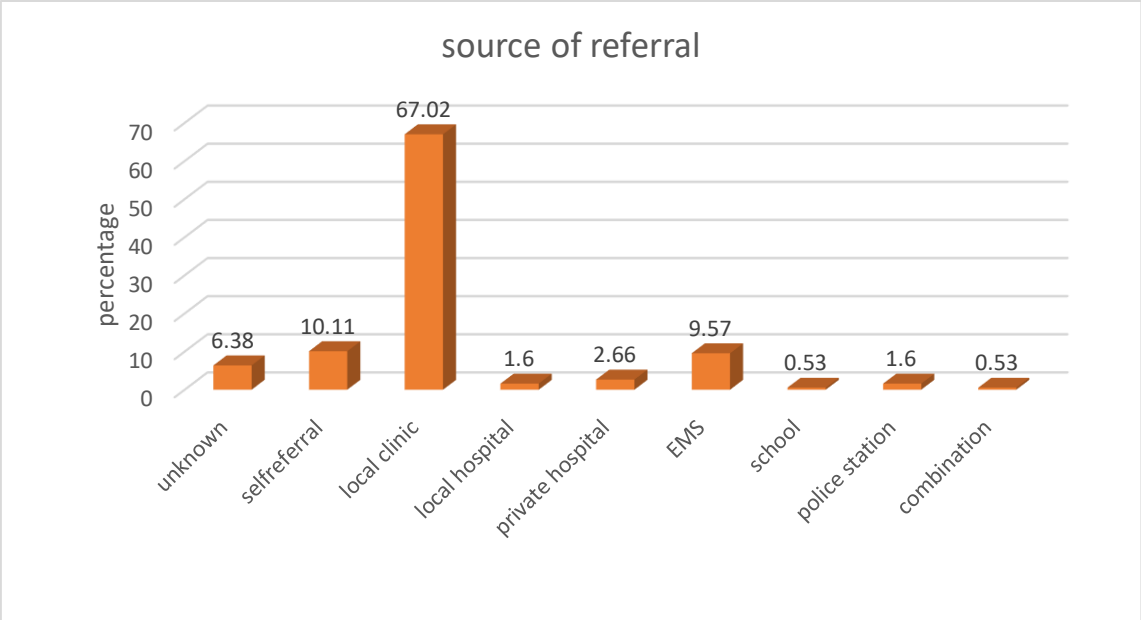

Figure 6. Showing Patients' Distribution by Referral Sources among Parasuicide Cases Registered at the Accident and Emergency of PMH

The study found that 62.77% of the sample study did not have any comorbidities, 26.03% reported one comorbidity and 3.19% of multiple.

62.23% were HIV positive versus 19.68% negative. The remaining did not perform the test (18.09%).

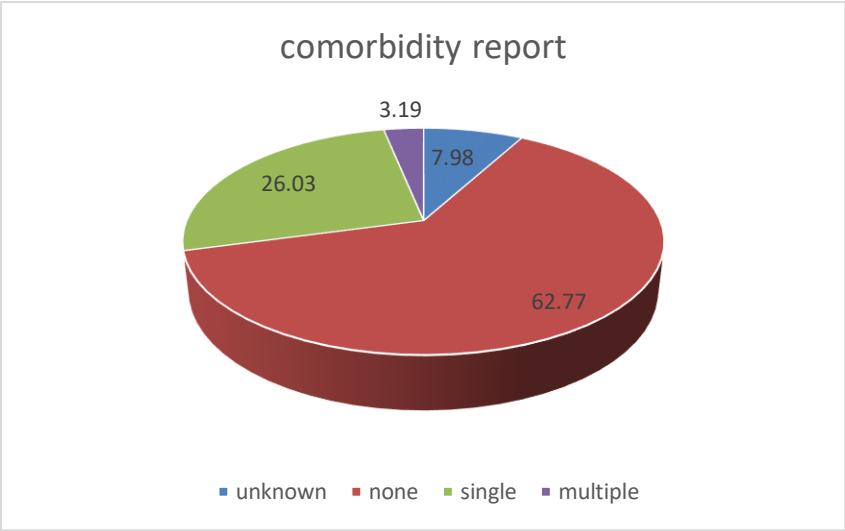

Figure 7. Showing Patients' Distribution by Morbidity Associated among Parasuicide Cases Registered at the Accident and Emergency PMH

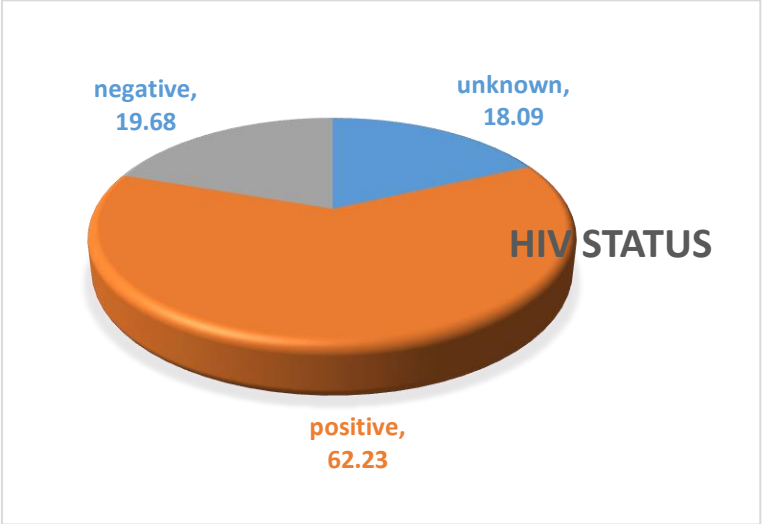

Figure 8. Showing Patients' Distribution by HIV Status among Parasuicide Cases Registered at the Accident and Emergency of PMH

Table 6. Showing Patients' Distribution by CNS Symptoms/Signs among Parasuicide Cases Registered at the Accident and Emergency of PMH

CNSComp	Freq.	Percent	Cum.
0	138	73.40	73.40
1	50	26.60	100.00
Total	**188**	**100.00**	-

Legend: 0: absent, 1: present; CNSComp: CNS symptom/signs

73% of patients had no CNS symptoms.

67.55% had normal hematologic markers versus deranged FBC in 17.02%.

There was no cardiac symptom in 82.45% of patients in the sample population.

Table 7. Showing Haematology Report among Parasuicide Cases Registered at the Accident and Emergency of PMH

HematRep	Freq.	Percent	Cum.
0	32	17.02	17.02
1	127	67.55	84.57
2	29	15.43	100.00
Total	**188**	**100.00**	-

Legend: 0= deranged; 1= normal; 2= not performed; HematRep: hematology report

Table 8. Showing Patient Distribution by Cardiac Symptoms/Signs among Parasuicide Cases Registered at the Accident and Emergency of PMH

CardioComp	Freq.	Percent	Cum.
0	155	82.45	82.45
1	33	17.55	100.00
Total	**188**	**100.00**	-

Legend: 0: absent; 1: present; cardiocomp: cardiovascular symptoms/signs

Table 9. Showing Renal Function Report among Parasuicide Cases Registered at the Accident and Emergency of PMH

RenRep	Freq.	Percent	Cum.
0	16	8.51	8.51
1	137	72.87	81.38
2	35	18.62	100.00
Total	188	100.00	-

Legend: 0= deranged; 1= normal; 2= not performed

The sample population shows that 72.87% of patients had normal kidney function, 8.51% were deranged and in 18.62%, the test was not performed.

The Table 10 shows that the majority of patient with GI symptoms have normal liver enzymes level.

86.70% of parasuicide cases were orange and 6.38% were red. 6.38% were yellow (Figure 9).

In general, 92.03% of patients attempted suicide for the 1st time. Very few were repeated for the 2nd time representing 6.91% of the sample data (Figure 10).

Table 10. Showing Patients Distribution by GI Symptoms/Signs and Liver Function Report among Parasuicide Cases Registered at the Accident and Emergency of PMH

GIComp	0	1	2	3	Total
0	8	71	25	1	**105**
1	13	59	11	0	**83**
Total	**21**	**130**	**36**	**1**	**188**

Legend: GI symptoms/signs: 0.absent; 1. Present; Liver function report: 0=deranged; 1= normal; 2= not performed

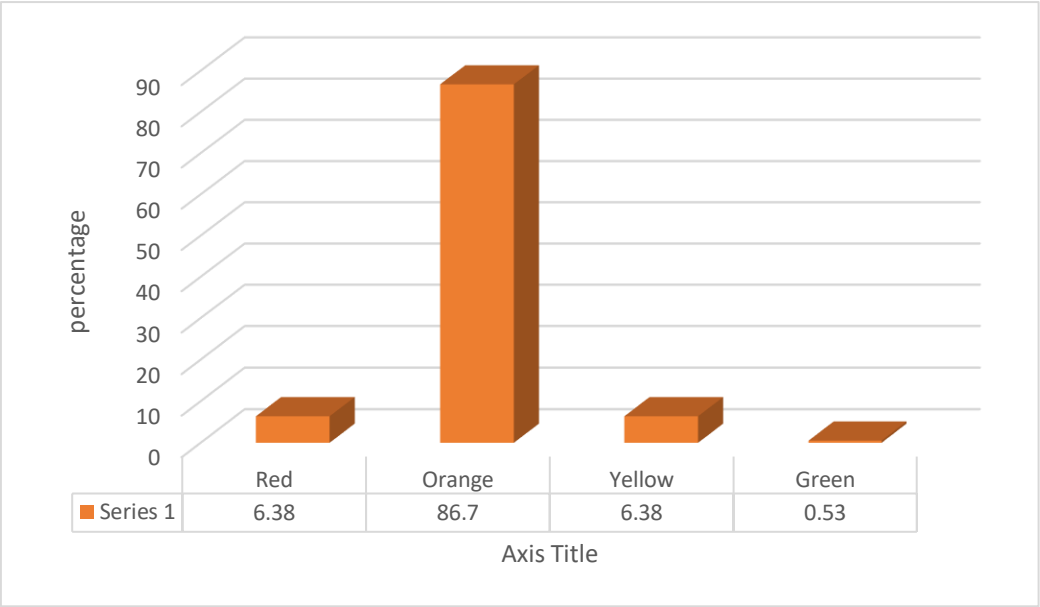

Figure 9. Showing the Severity of Parasuicide Cases Registered at the Accident and Emergency of PMH

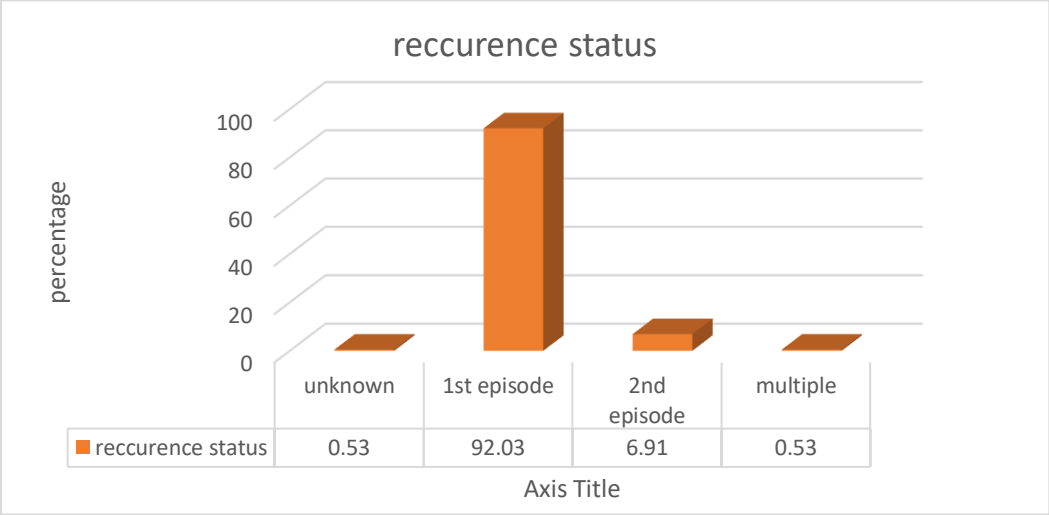

Figure 10. Showing the Recurrence Status of Parasuicide Cases Registered at the Accident and Emergency of PMH

Table 11. Showing Patients Distribution by Gender and Method Used among Parasuicide Cases Registered at the Accident and Emergency of PMH

	Unknown	**Hanging**	**Suffocation**	**Burning**	**Toxic agents**	**Combination**	**Total**
Female	1(100%)	2(33.33%)	1(100%)	0(0%)	133(80.12%)	13(100%)	**150**
Male	0(0%)	4(66.67%)	0(0%)	1(100%)	33(19.88%)	0(0%)	**38**
Total	**1(0.53%)**	**6(3.19%)**	**1(0.53%)**	**1(0.53%)**	**166(88.29%)**	**13(6.91%)**	**188**

In our sample study, the majority of patients uses toxic agents in a parasuicide process. Among 166 patients, 133(80.12%) were female and 33(19.88%) were male. There is a considerable number of patients who combined different methods (6.91%). There were all females. Males predominated in the violent methods like hanging (66.33% v 33.33%) and burning (100%).

Table 12. Showing Patients' Distribution by Gender and Toxic Agents Used among Parasuicide Cases Registered at the Accident and Emergency of PMH

	None	Plant	Chemicals	Medications	Combinations	Total
Female	4(50%)	2(66.67%)	24(72.73%)	105(81.39%)	15(100%)	**150**
Male	4(50%)	1(33.33%)	9(27.27%)	24(18.31%)	0(0%)	**38**
Total	**8(4.25%)**	**3(1.59%)**	**33(17.55%)**	**129(68.61%)**	**15(7.97%)**	**188**

Among the toxic agents used, pharmaceuticals products and chemicals were the most used (68.61% v 17.55%). At 1.59%, plants poisoning were considered. There was 7.97% of combination of different products, mostly chemicals and medications. Looking at the gender, female were predominant (81.39% v 18.31% of medications and 72.73% v 27.27% of chemicals) than males.

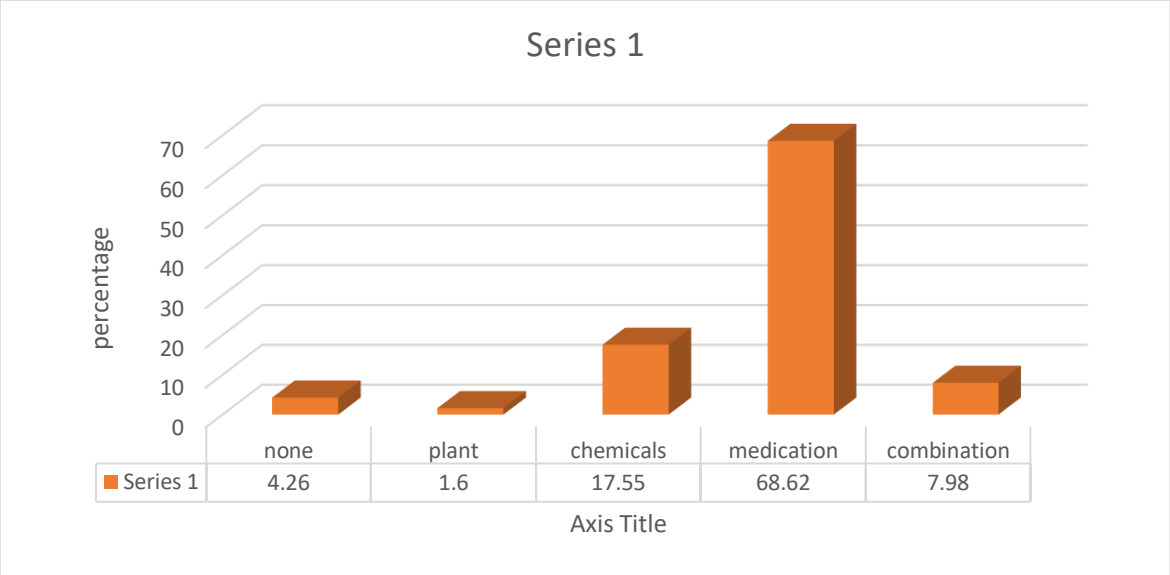

Figure 11. Showing Patients' Distribution by Toxic Substances Used among Parasuicide Cases Registered at Accident and Emergency of PMH

As said previously in Table 11, the result shows that 68.62% of patients used medication to attempt suicide. 17.55% used some chemicals and 7.98% combined different products.

Table 13. Showing Patients' Distribution by Gender and Toxic Drugs Used among Parasuicide Cases Registered at the Accident and Emergency of PMH - MediTox

Gender	0	1	2	3	4	5	6	8	9	10	11	12	13	Total
1	32	3	12	16	4	1	2	7	1	1	49	21	1	150
2	14	0	6	6	2	0	0	1	0	0	6	2	1	38
Total	**46**	**3**	**18**	**22**	**6**	**1**	**2**	**8**	**1**	**1**	**55**	**23**	**2**	**188**

Legend:

1. *Gender: 1. Female; 2. Male.*
2. *Medication used: 0= none; 1= antibiotics; 2= ARV; 3= antipyretic/antalgic/anti-inflammatory; 4= supplement; 5= contraception; 6= ATT; 7= opioids; 8= sedatives; 9= antacid; 10= chemotherapy; 11= combination; 12= unknown; 13= antiepileptic.*
3. *MediTox: medication used for intoxication.*

It has been shown that among toxic agents, medications are the most utilised for parasuicide. Table 12 shows that 55 patients (29%) combined different pills. 23(12.3%) patients did not know the name of the pills used. 22 patients (11.7%) used pain and fever control medication. 18 patients (9.57%) used ARV. These pharmaceuticals products were predominantly used by females: combination (89% v 11%), unknown names (91% v 9%), pain medications (72% v 28%), ARV (67% v 33%).

Table 14. Showing Patients' Distribution by Chemical Substances Used among Parasuicide Cases Registered at Accident and Emergency of PMH

ChemTox	Freq.	Percent	Cum.
0	141	75.00	75.00
1	2	1.06	76.06
2	12	6.38	82.45
3	1	0.53	82.98
4	2	1.06	84.04
5	2	1.06	85.11
6	2	1.06	86.17
7	5	2.66	88.83
8	1	0.53	89.36
9	5	2.66	92.02
10	6	3.19	95.21
11	7	3.72	98.94
12	1	0.53	99.47
13	1	0.53	100.00
Total	**188**	**100.00**	

Legend: 0= none; 1= body lotion; 2= insect/ants poisoning; 3= permanganate of K; 4= paint solution; 5= antiseptic product; 6= battery acid; 7= kitchen chemicals; 8= ink; 9= paraffin; 10= ethanol; 11= mixture of previous product; 12= unknown; 13= mechanical product.

In the sample population, insect poisonings (6.38%), paraffin (2.66%), and ethanol (3.19%) are the most chemicals involved in the parasuicide process. In about 3.72% of cases, a combination of different chemicals was made.

Table 15. Logistic Regression by Method Used and Level of Severity

Outcostat	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
MethUsed	.2088725	.9887679	0.21	0.833	-1.729077	2.146822
codsev	-	-	-	-	-	-
2	-2.009346	1.266287	-1.59	0.113	-4.491223	.4725311
3	0	-	-	-	-	-
4	0	-	-	-	-	-
_cons	-3.211776	4.04599	-0.79	0.427	-11.14177	4.718219

The negative likelihood value shows that there is little correlation between the type of method used and the code of severity of parasuicide cases admitted at accident and emergency of princess marina hospital.

No death has been reported. 98.40% were released without any complication (Table 16).

Table 16. Showing Patients' Distribution by Outcome among Parasuicide Cases Registered at the Accident and Emergency of PMH

Outcostat	Freq.	Percent	Cum.
0	185	98.40	98.40
1	3	1.60	100.00
Total	**188**	**100.00**	-

Legend: 0= alive without complication; 1= alive with complication; 2= death

The negative figure infers that the waiting time as well as the code of severity has less impact on the outcome of parasuicide cases admitted at the accident and emergency department.

Table 17. Logistic Regression by Outcome, Waiting Time, and Level of Severity

Outcostat	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
waittime	0	(omitted)				
codsev						
2	-1.878771	1.264062	-1.49	0.137	-4.356287	.5987458
3	0	(empty)				
4	0	(empty)				
_cons	-2.397895	1.044466	-2.30	0.022	-4.445011	-.3507797

Table 18. Pearson Chi2 and Fisher's Exact Test - MethUsed

Gender	0	1	2	3	4	5	Total
1	1	2	1	0	133	13	**150**
2	0	4	0	1	33	0	**38**
Total	**1**	**6**	**1**	**1**	**166**	**13**	**188**

Pearson Chi2 (5) = 15.78.73; Pr = 0.007; Fisher's exact = 0.004

Fisher test with the p-value of 0.004 indicate that there is strong correlation between the gender and the choice of method for parasuicide.

Table 19. Showing Status of Waiting and Throughput Time among Parasuicide Cases Registered at the Accident and Emergency of PMH

Wait time	0	1	2	Total
0	0	4	10	14
1	0	4	1	5
2	2	29	138	169
Total	**2**	**37**	**149**	**188**

Legend: 0= unknown; 1= within the required time; 2= beyond the required time, waitime= waiting time; tpttime = throughput time

The large majority of patient waited beyond the required time to be attended by medical officer (169, 89%). In the same way they stayed beyond time in the ward before being dispatched from the accident and emergency (149, 79%).

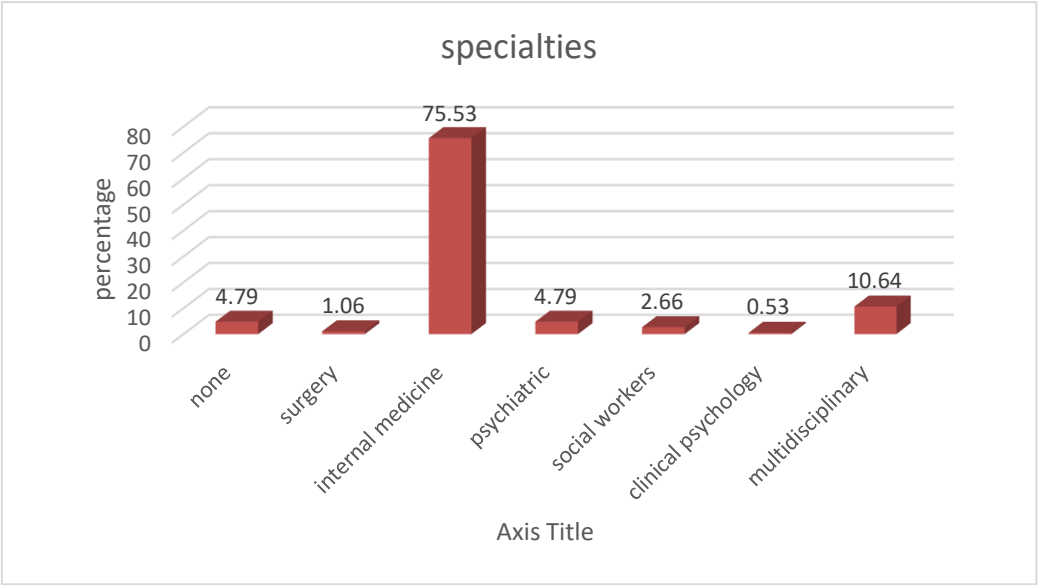

Figure 12. Showing the Different Specialties Involved in Parasuicide Cases Registered at the Accident and Emergency of PMH

75.53% cases were attended by the physician, while about 10.64% were followed by a multidisciplinary team. The psychiatric team was involved in 4.79% of cases. There is a number of patients (4.79%) discharged through the accident an emergency without being attended by any other specialties.

69.15% of the parasuicide cases are admitted in the wards while 29.79% are discharge home. Few patients had absconded representing 1.06%

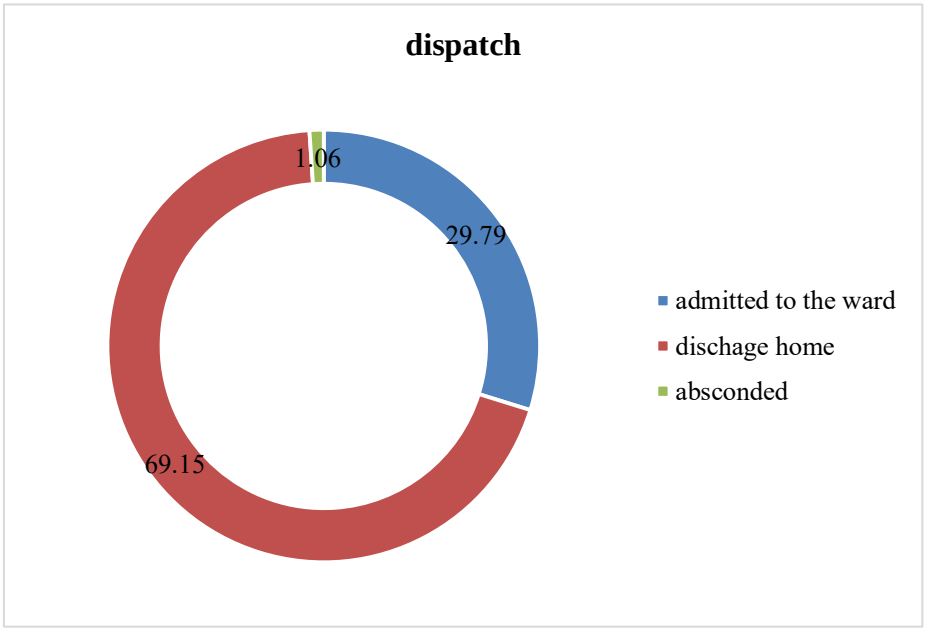

Figure 13. Showing the Dispatch of Parasuicide Cases Registered at the Accident and Emergency of PMH

Logistic regression, Number of obs =188.
LR chi2 (1) =2.28.
Prob > chi2 =0.1313.
Log likelihood = -14.250872 Pseudo R2 = 0.0740 (Table 20).

Table 20. Logistic Regression by Outcome and Code of Severity

Outcostat	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
codsev	-2.03139	1.227055	-1.66	0.098	-4.436374	.3735934
_cons	-.3453592	2.148364	-0.16	0.872	-4.556074	3.865356

As reported in Table 19, there was no correlation between the code of severity and the outcome of parasuicide cases at the ED.

Logistic regression, Number of obs = 188.
LR chi2 (1) = 2.22.
Prob > chi2 = 0.1362.
Log likelihood = -14.27916, Pseudo R2 = 0.0721 (Table 21).

Table 21. Logistic Regression by Outcome and Renal Report

Outcostat	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
RenRep	.1852061	.2064492	-1.51	0.130	.0208363	1.646226
_cons	.0729122	.0699526	-2.73	0.006	.0111211	.4780251

The OR is 0.18, indicating that the outcome of parasuicide patients was less influenced by the deranged renal function results.

Logistic regression, Number of obs= 188.
LR chi2 (1) = 0.00.
Prob > chi2 = 0.9610.
Log likelihood = -15.388227.
Pseudo R2 = 0.0001.
OR = 1.05; this indicate that the outcome of the parasuicide cases was strongly influenced by the deranged hematologic markers.

Table 22. Logistic Regression by Outcome and Haematology Report

Outcostat	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
HematRep	1.051291	1.074621	0.05	0.961	.1417853	7.794972
_cons	.0154313	.0181479	-3.55	0.000	.0015394	.1546867

Table 23. Summary

Variable	Obs	Mean	Std. Dev.	Min	Max
SIN	188	97.5	54.41507	4	191
Age	188	24. 82447	7.950787	14	69
Gender	188	1.202128	0.4026593	1	2
Occupstat	188	1.558511	l.143118	0	3
Influstat	188	1.920213	1.763873	0	8
Refsource	188	2.260638	1.399444	0	8
Waittime	188	l.824468	0.5433479	0	2
Tpt time	188	1.781915	0.4391199	0	2
Codsev	188	2.010638	0.3868059	1	4
Comorbrep	188	l.244681	0.6406242	0	3
HIVstat	188	1.015957	0.6159733	0	2
Parasrecu	188	l.074468	0.3011337	0	3
Symptpres	188	3.351064	2.617128	0	6
Investperf	188	0.8510638	0.3569762	0	1

ConstComp	188	0.4202128	0.494911	0	1
GIComp	188	0.4414894	0.4978906	0	1
CNSComp	188	0.2659574	0.4430215	0	1
RenComp	188	0.0053191	0.0729325	0	1
CardioComp	188	0.1755319	0.3814372	0	1
HematRep	188	0.9840426	0.5709179	0	2
LivRep	0	-	-	-	-
RenRep	188	1.101064	0.5123073	0	2
RayRep	188	0.9680851	0.1762429	0	1
PrimMan	188	0.4202128	0.5056007	0	2
TreaTyp	188	l.691489	1.565173	0	4
TreatSyst	188	2.835106	2.581183	0	8
DepartRef	188	0.0478723	0.2140662	0	1
DepartInt	188	2.643617	1.726054	0	7
MethUsed	188	3. 93617	0.6830023	0	5
ToxUsed	188	2.744681	0.8002162	0	4
ChemTox	188	1.643617	3.413658	0	13
MediTox	188	6.042553	4.959547	0	13
MediUse	188	l.367021	0.9581498	0	3
Outcostat	188	0.0159574	0.1256454	0	1
HospDisp	188	0.712766	0.4766716	0	2

Table 25 provides the mean – age with standard deviation at 24.8 +/- 7.9 years old.

Discussion

This study sought to determine different characteristics of parasuicide amongst patients presenting at the accident and emergency of princess marina hospital. The initial management as well as the outcome was also investigated.

Overall, parasuicide is shown to be more prevalent in female than male in this study. This finding is consistent with reports submitted by other investigators [9]. In this study, parasuicide reaches its peak in the age group 21 – 30 years old, and it decreases slowly to close to nil beyond 50 years. There is as well a high percentage of teenagers attempting suicide. This finding is in correlation with previous investigators' reports [9]. Furthermore, the prevalence of parasuicide among the predominant age-groups is higher for females than males.

Although we have a huge number of patients with non-specified occupational status, most patients in the population study were students followed by the unemployed. Very few patients reported to be employed. This shows that the circumstances surrounding students' activities like exams 'results as well as the status of unemployment which follows the end of school, may influence suicide tendency. Furthermore, passional conflict, family conflicts and other social problems have a considerable impact on the parasuicide process. These negative life events have been raised in other reports by previous investigators [10].

About the source of referral, most patients in the population study seek medical assistance through local clinic and/or EMS. There was a non-negligible number of self-referral. This has an impact on the severity of patients' conditions as well as their outcome, as most of the patients get medical assistance much early before arrival at the emergency department.

In this study, most patients were healthy (62.77% of patients without comorbidity) against about 30% of patients with comorbidities other than HIV/aids. While looking at their HIV status, 62% were positive. This is in correlation with previous studies which highlighted medical conditions as one of the triggering factors leading to parasuicide [11].

Tables 6 – 10 described the clinical presentation of patients with parasuicide at the time of admission to the emergency department. In general, parasuicide cases are more likely to develop gastrointestinal symptoms (44.14%) than CNS (26.60%) and cardiac symptoms (17.55%). However, a quarter of the patients has deranged basic blood results affecting vital organs (11.17% for the liver, 17.02% for FBC and 8.51% for the kidneys). In previous studies, CNS disturbance were shown to be predominant with 20% of laboratory results disturbances [12].

However, the blood tests were performed in an acute situation at the time of admission at the accident and emergency department. No further investigations were performed to establish whether the acute organic injuries (liver or kidney) and hematologic disturbances were permanently established or resolved. Thus, a future study will be necessary on this matter.

This study also looked at the severity of parasuicide cases attended at the accident and emergency department. Based on the triage system used at the department, parasuicide cases are color-coded according to the clinical presentation. This study found that 86.70% of cases were coded orange, while 6.38% were coded red and yellow each. Only 0.53% was green. This code defined the urgency of the case. According to this findings, most patients are coded orange and require urgent medical attention (within 20 minutes of arrival to the emergency department). The patients were coded as very urgent based on their clinical findings and not because of their suicidal attempt or ideation. This is in correlation with several previous study [13]. In the Allison 'study, another type of scale to define the urgency of the conditions was used.

However, the study shows that most patients waited longer to be attended by the doctors (90%) after being triaged. This is probably explained by the chronic shortage of doctors at the emergency department of the Princess Marina hospital. Furthermore, parasuicide cases are generally considered as "attention seeking", manipulative behavior" or "cry for help".

Also, most patients waited longer again to be dispatched from the emergency department (79%). This delay is due to the admission protocol at this referral facility. Generally, patients wait for the admitting team to review them in the emergency department. In Other hospitals, such patients will be sent to the relevant specialty after being attended and stabilized by the emergency doctors.

Moreover, the severity of parasuicide cases was also indexed by the recurrence of the parasuicide. This study has shown that most patients attempted suicide for their 1st time (92.02%). Only 6.98% repeated a suicidal attempt. This figure is less than findings from previous studies, which reported 15% of previously attempted suicide admitted at the emergency department [14].

In this study, different methods were used in the parasuicide processes. Non-violent methods were used in 88.3% of cases. Very few patients used violent methods like hanging (3.19%, suffocation (0.5%), burning (0.5%). This finding correlates with the previous publication [15]. Also, looking at the non-violent methods, females were predominant than males (80% and 20%respectively). Concerning the types of toxic agents used, pharmaceuticals and chemicals products were the most utilized products for parasuicide (68.62% and 17.55% respectively). 7.98% of patients combined different toxic agents. The study also shows that it is rare for our patients to opt for plant poisoning during a parasuicide process.

Furthermore, the study looked at the choice of toxic agents among genders. The finding confirmed that females were using pharmaceuticals (81.6% v 18.6%) and chemicals (71.7% v 27.3%) more than males. Also, only female combined different toxic agents (100%).

Looking at the pharmaceuticals, the study finds that in majority of cases, patients combined different pills (). There is a very high number of patients using pills without knowing the names. This is explained by the fact that the population in Botswana generally addresses pills more by the consistency and the color than the names. This was followed by the over-the-counter pills like antipyretic, antalgic and anti-inflammatory tablets accounting for. These tablets are generally kept at home. This finding confirms previous studies from other authors [9].

Concerning the chemicals, the sample population study shows that the most used chemicals are insect poisoning, ethanol, paraffin, and kitchen chemicals. A considerable number of patients made a cocktail of these products. In previous study done in Botswana, household chemicals were predominant, and very few cases of patients used insect poisoning [9].

In this study, the outcome of the patients in the population study shows satisfactory results. Most patients were discharged without any complications (98.40%) and not death was recorded. Yet this outcome is limited to the acute setting and did not take into consideration the long term impact of suicidal attempt.

At the emergency department, most patients (75.53%) were attended by the internal medicine team. This team generally admits these cases as the facility lack a psychiatric ward or units. In some circumstances, the psychiatric team (4.79%), the clinical psychologist (0.53%) and the social workers (2.66%) were involved in the management of these patients. Only 10.44% of patients were concomitantly managed by a multidisciplinary team. In an acute setting, there is lack of multidisciplinary involvement, which may impact the future outcome of these patients. Different research have demonstrated the importance of a multidisciplinary team for patients with suicidal attempts and ideation. This team can be built at the first contact at the ED department, in goal to reduce the future complication and recurrence of parasuicide [16].

Limitations of the Present Study

Firstly, the present study was conducted at the referral hospital which is in the urban area. So, the result could not be generalized to the entire population; as residents from rural areas have different habits and may attempt suicide using different methods (traditional medicines, plant poisoning).

Also, the study was retrospective relying on the quality of data kept at the hospital. Moreover, there was frequently an “unknown” parameter in all the variables studied. Furthermore, we did not have permission to get in contact with the population sample to complete missing data like socio demographic information.

Lastly the investigations performed were limited to the basic blood parameters (hematology, liver functions and kidneys functions) and could not specify the types of toxic agents used.

Conclusion

Study was conducted at one a public referral hospital in Gaborone, among patients who are generally originated from Botswana with easy accessibility to medical care. The main findings of this study are summarized as follow:

1. Parasuicide represents 0.88% of patients at the ED of PMH.; and in general, with very good outcome.
2. Female were largely predominant in most of all the group age with a peak among teenagers and young adult. The mean age was found to be 24.8 years old with a

predominance of the age group between 21 and 30 years old.

3. Factors associated with parasuicide are predominantly passional conflicts, family conflicts and social problems. In a non-negligible percentage, the triggers were multifactorial.
4. Most patients were students and unemployed, which correlate with the predominant age group.
5. Most patients were free of comorbidity other than retroviral diseases. Although more than 60% of patients have HIV/AIDS, we could not establish a correlation between HIV and parasuicide.
6. Looking at the clinical presentation, most of patients are asymptomatic, with normal blood results.

Different methods are used for parasuicide. Non-violent methods like ingestion of toxic agent are more predominant in female than in males. Also, among the toxic agents used, pharmaceuticals products and chemicals are the most used.

In a few cases, patients are attended to through a multidisciplinary approach, impacting their future outcome.

Taking into consideration the findings and the limitations of this present study, further prospective studies are recommended to elaborate different areas of this study which are, and not limited to, the rural area, the management of parasuicide in district and primary hospitals; and the role of the multidisciplinary approach and its future impact in the management of parasuicide cases.

Conflict of Interest

The authors declare that there is no conflict of interest with respect to the work described in this manuscript.

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Prevalence and Risk Factors Associated with Maternal Near Miss Events in the Upper East Region of Ghana

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Abstract

A maternal near miss (MNM) event is a severe life-threatening maternal morbidity that reflects quality of obstetric care. It is considered a proxy of maternal mortality and predictor of quality obstetric care. The major underlying causes of MNM are hypertensive disorders, obstetric hemorrhage, sepsis and abortion complications. MNM is a more frequent event than maternal mortality and share several features together. Inquiries intodeficiencies andcritical assessment of health care quality, identify health system deficiencies, and help develop robust strategies for maternal care. We conducted a cross-sectional descriptive study to determine the prevalence and underlying causes of MNM. The study respondents were women aged 15 - 49 years with pregnancy experience in 2020 who had health facility care. Primary and secondary data were collected at households and health facilities respectively using electronic platform, KoBoCollect. STATA version 15.0 was used to analyze the data. The prevalence of MNM was 11.30%. The main underlying causes were complications of caesarean section, hypertensive disorders, anemia, obstructed labor, and antepartum hemorrhage. The main signal functions of emergency obstetric and newborn care (EmONC) employed to avert death were parenteral antibiotics, blood transfusion, caesarean section, and magnesium sulphate. The prevalence of MNM in the Upper East region was high. The region can reduce severe maternal morbidity and mortality by strengthening health systems, improving access to high-quality obstetric care and training healthcare providers to prevent and treat the major underlying causes of MNM identified in this study.

Keywords*: Ghana, MNM, Mortality, Prevalence, Antepartum, Hemorrhage, EmONC.*

Introduction

Maternal near miss (MNM) is an important maternal health indicator which provides significant insight into maternal mortality [1, 2]. Maternal mortality is a global health issue that reflects health care quality inequalities and highlights the development gap between rich and poor nations [3]. The continued high maternal mortality ratios posted by least developed countries is indicative of underfunding of primary health care services, lack of skilled health providers, supply chain inefficiencies and stockout of medical supplies [4]. As a result, maternal mortality ratio is regarded as the key measure of the level of quality obstetric care provided [5, 6]. The World Health Organization (WHO) defined MNM as a woman who nearly died but survived a complication that occurred during pregnancy, childbirth, or within 42 days of termination of pregnancy [6 - 8]. The survival could either be due to high quality obstetric care received or by chance [6, 7]. MNM is a more frequent event than maternal mortality and both share several features including association with

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inadequate and poor quality of obstetric care [1, 2, 7, 9]. In Ethiopia, MNM was estimated to be 12 times more frequent than maternal mortality [10, 11]. MNM is thus considered a proxy of maternal death and a predictor of the quality obstetric care [1].

The global prevalence of MNM is 1.4% [10, 12, 13,] with higher burden in Africa and Asia [2, 7, 14]. In 2012, Tuncalp et al. found a hospital-based incidence of MNM in Accra, Ghana to be 3% [14]. It has been estimated that for every woman that dies, about 20 more experience acute and chronic obstetric complications from direct cause of obstetric complication [7, 13, 15]. MNM is a multifaceted issue associated with socio-economic status, health events, health worker competence and sub-standard facilities [16, 17, 18]. The markers of MNM include experience of a potentially life-threatening pregnancy condition, receiving a critical maternal intervention or signal function of EmONC and evidence of organ dysfunction [19-23]. The underlying causes of MNM include poverty, lack of maternal education, lack of maternal autonomy to seek medical care, poor access to high-quality obstetric care, obstetric hemorrhage, hypertensive disorders of pregnancy, poor practice of birth preparedness and complications readiness plan, pre-existing medical condition, induction of labor, sepsis, ruptured uterus, abortion complications, the three delays of obstetric care and previous caesarean section (1, 7, 8, 10, 15, 24-27]. The provision of signal functions of EmONC such as blood transfusion, laparotomy, magnesium sulphate and parenteral antibiotics to manage obstetric complication is indicative of MNM [7, 10]. Based on the association between maternal death and MNM, lessons learnt from MNM studies can provide critical assessment of health care quality, identify health system deficiencies and help develop alternative strategies for combating severe maternal morbidity and mortality [1, 7, 8, 10, 28-30]. This paper therefore examined the prevalence of MNM and its associated risk factors in Upper East region of Ghana.

Materials and Methods

Study Area

This study was conducted in Upper East region located in the northern part of Ghana. Ghana is a lower middle-income country in West Africa. The region occupies 2.7% of Ghana's land mass constituting 8,842 km^2. The region had a projected population of 1,302,718 in 2020 with an annual growth rate of 1.2%. The total fertility rate was 4.9. Women in fertility age (WIFA) were 312,652 with annual expected pregnancy estimated as 52,109. The region had one (1) Regional hospital, 6 District hospitals, 48 Health centers and 233 demarcated CHPS zones or national primary health care divisions according to 2020 annual projections. This region is deprived with high levels of poverty [31].

Study Design

This was a cross-sectional descriptive study conducted according to the STROBE guidelines [32]. We assessed the prevalence of maternal near miss and associated risk factors. This was part of a cost-effectiveness analysis of a community emergency transport system study. The adapted sub-Saharan Africa MNM criterion was used to classify women with life-threatening complications, critical interventions, or signal functions of EmONC as well as evidence of organ dysfunction [33].

Study Population and Sampling Strategy

The study population was all women aged 15 - 49 years with experience of pregnancy within the period January to December 2020 in the Community-based Health Planning and Services (CHPS+) project area. CHPS zone is a national mechanism to deliver essential community-based health services involving planning and service delivery with communities. It refers to a demarcated geographical area of a 4-kilometer radius and between 4500-5000 persons or 750

households in densely populated areas [34]. The CHPS+ was a 5-year Primary Health Care (PHC) project implemented in 120 CHPS zones by Ghana Health Service in Upper East region with support from Korea International Cooperation Agency (KOICA) [31]. Using Taro Yamane formula,

$$n = \frac{N}{1 + Ne^2}$$

for proportions [35] at a precision level (e) of 0.05 with N, as the population (1,302,718), the sample size estimated was 400. The final sample size was 440 after adding 10% for non-response.

The study adapted the CHPS+ project implementation sampling strategy to select 100 CHPS zones out of the 120 covering all the districts in the region [31]. A multi-staged random selection was used to select at least one community and households from the selected CHPS zones. In each of the selected households, all females aged 15 - 49 years with pregnancy experience between January1 – December 31, 2020, in the household who met the inclusion criteria were selected into the sample until a sample of 5 respondents was achieved. In all 440 respondents constituting the sample were selected for the study.

Variables and Data Collection

Primary data were collected at the household level through face-to-face interviews and secondary data were abstracted from obstetric records at respective health facilities. The electronic platform, KoBoCollect, was used for data collection. The data collected included socio-demographic, obstetric characteristics of women, means of referral transport to health facility for childbirth and obstetric emergency during the period.

Data Analysis

STATA version 15.0 was used for statistical analysis. Descriptive analysis was conducted on socio-demographic characteristics, access to obstetric care and information variables, obstetric characteristics, transportation, and communication variables. The results were presented as frequencies and percentages for variables of interest.

Results

Socio-demographic Characteristics of the Women

A total of 416 pregnant women were studied. The age of women ranged from 15 – 47 years with a mean of 26.2 ± 8.1 years. Almost all the women were married, and majority were of Christian faith. In addition, majority of women had no formal education and less than 10% had tertiary education. Majority of the women were farmers followed by traders. The predominant ethnic groups among the respondents were the Kusaal and the Frafra (Table 1).

Table 1. Socio-demographic Characteristics of the Women

Variable	Frequency (n)	Percentage (%)
Age of women (Years)		
Range: 15 – 47		
Mean: 26.2 ± 8.1		
Marital status		
Married	407	97.84
Never Married	4	0.96
Separated/divorced	3	0.72
Co-habiting	2	0.48
Religious affiliation		
Christianity	258	62.02
Islam	140	33.65

Traditional	18	4.33
Level of education		
No education	171	41.11
Middle/JHS	89	21.39
Primary	67	16.11
SHS/Vocational	56	13.46
Tertiary	33	7.93
Husband's educational status		
No education	178	42.79
Middle/JHS	87	20.91
Primary	65	15.63
SHS/Vocational	54	12.98
Tertiary	32	7.69
Husband's primary occupation		
Farming	294	70.67
Trading	53	12.74
Salaried employee	38	9.13
Unemployed	16	3.85
Artisan	10	2.40
Others	5	1.2
Monthly household income		
Range (GH₵): 7.00 - 2000.00		
Range (USD): 1.43 - 408.16		
Median (IQR) (GHS): 100.00 (40.00 - 150.00)		
Median (IQR) (USD): 20.41 (8.16 - 30.61)		
Ethnicity		
Kusaal	132	31.73
Frafra	117	28.13
Buli	45	10.82
Bimoba	43	10.34
Kasem	35	8.41
Nankani	15	3.61
Busanga	11	2.64
Others	18	4.33

GH₵4.9 = 1USD

Access to Obstetric Care and Information

Almost all the women had financial access to care by means of holding active National Health Insurance Scheme (NHIS) membership card. Majority, 70% of the women lived within 5 kilometers of an EmONC facility.

The place of care for the majority (60%) of pregnant woman was decided by the husband followed by self (35%). The most common medium for obstetric information to households was the radio and almost all households own a phone.

The means of calling an ambulance during maternal emergency was by a cell phone (63%), followed by a health worker and lastly, by a community health volunteer (24%). The most common means of referral transportation during maternal emergency was motorbike (51%) and

motorking tricycle ambulance (34.62%) (Table 2).

Obstetric Characteristics of the Women

Majority (54%) of the women were multipara and 94% of them carried their last pregnancy to maturity or term. The mode of delivery was mostly normal vaginal delivery while only 8.65% of the women had caesarean section. Majority of the neonates were of the male gender (54%).

The most common places for childbirth were the health centre (46%) and the hospital (38%). Almost all mothers had caregivers during health facility admission. All the women survived (Table 3).

Risk Factors Associated with Maternal Near Miss Events

The underlying causes of potential life-threatening conditions of the women were hypertensive disorders of pregnancy, obstructed labor, antepartum hemorrhage, anemia, ruptured uterus, abortion and caesarean section complications (Table 4). The main critical interventions or signal functions provided to the women were caesarean section to manage obstetric complications, blood transfusion due to maternal anemia and caesarean section bleeding complication, hysterectomy, magnesium sulphate protocol for severe preeclampsia and eclampsia, and parenteral antibiotics for sepsis from abortion and caesarean section complication (Figure 1).

Prevalence of MNM

Out of the 416 study respondents, 47 met the criterion for MNM giving a MNM prevalence of 11.3% (Figure 2).

Categorization of MNM

The categorization of life-threatening complications experience and critical interventions or signal function received by the women based on MNM criterion led to the determination of 47 MNM (Table 5).

Discussion

The objective of this study was to determine the prevalence and underlying causes of MNM in the Upper East region. The computed prevalence of MNM was 11.3%. The prevalence in this study was much higher than the global pooled prevalence of 1.4% [13] and the hospital-based incidence of 3% in Accra, Ghana [36]. The lower incidence in Accra could be due to better access and quality of obstetric care being the capital city of Ghana compared to the deprived northern part of the country where the study was conducted [31]. However, the MNM prevalence of 11.3% in this study was consistent with 12.2% reported for sub-Saharan Africa [10] but substantially lower than 16.1% in Sidama region of Ethiopia, 15.8% in northwest Ethiopia, 94.1% in South Sudan, 31.5% in northeast region of Brazil and 25.2% in east Iraq [1, 10, 27].

Majority of women enrolled in this study were of a younger maternal age. The young age of most mothers may have resulted in much lower prevalence compared to other regions such as Ethiopia, South Sudan, East Iraq since MNM prevalence has been reported to increase with advanced maternal age [1, 7, 8, 12, 14]. Furthermore, higher age especially above 35 years is associated with chronic maternal medical disorders such as hypertensive disorders of pregnancy; a major underlying cause of MNM [1, 7, 8, 12, 14]. The study also found that majority of the women and their husbands had no formal education. Low maternal and paternal education has implications for accessing obstetric information and health seeking behavior [12]. Additionally, 50% of the women and their husbands were engaged in subsistence peasant farming with low median monthly household income of GH₵100.00 (20.41USD) and therefore mostly poor. Elsewhere, it has been reported that poverty and lack of maternal education are important underlying causes of MNM [1, 7, 10, 24, 25]. Although the study found good financial access to obstetric care and about 70% of the women also had good physical access since they lived within 5 km of an

EmONC facility nonetheless, weak maternal autonomy where in about 60% of households, husbands decided the place of care during pregnancy undermines prevalence of MNM. This is because poor physical access to care and low maternal autonomy are underlying factors of MNM [1, 7, 8].

The findings further showed that over 70% of the women were multipara and about 18% had some maternal complication with varying degree of severity. Additionally, over 46% of the women delivered at a Health centre and 8% had caesarean section delivery. Though caesarean section rate was lower than the 10 -15% recommended by the WHO, previous surgical delivery has been reported to increase the likelihood of MNM in the future from complications of hemorrhage, placental accreta in scar tissue, thromboembolism, uterine rupture and so on [10, 13, 37]. To minimize unnecessary risks for women, cesarean section particularly elective non-medical procedures should be undertaken with caution [37].

The main underlying causes of MNM identified in this study were caesarean section complications (45%), hypertensive disorders of pregnancy (21%), anemia (21%), obstructed labor (4.25%), antepartum hemorrhage (4.25%), ruptured uterus (2%) and abortion complication (2%). These findings are consistent with many other studies. Letorp et al. reported major causes of MNM in their study as eclampsia (42%), postpartum hemorrhage (13%) and iatrogenic complications of caesarean section (7.9%) [37]. In the study by Tolesa et al., nearly 50% of causes of MNM were due to hypertension disorder of pregnancy, then sepsis, obstetric hemorrhage, ruptured uterus and nearly with 75% occurring before arrival at the health care facility [10]. The Accra study also reported hypertensive disorders, obstetric hemorrhage, and anemia as major causes of MNM events [36]. The high proportion of caesarean section associated with MNM has been thought to be probably confounded by the complication necessitating surgical intervention [37]. This study further found that the main critical interventions or signal functions of EmONC employed were parenteral antibiotics (32%), blood transfusion (28%), caesarean section (27%), magnesium sulphate (12%) and hysterectomy (2%). This finding is similar to that of Geleto et al. who reported the most frequent signal function performed in their study as parenteral antibiotics followed by parenteral anticonvulsants and lastly, blood transfusion [7].

Limitations of the Study

The limitations of this study were recall biases from respondents and some poor documentations in secondary data sources. However, the probing techniques used in data collection reduced the recall biases. Therefore, we belief the limitations had minimal effect on the results.

Conclusion

MNM provide considerable insight into the quality of obstetric care and underlying causes of maternal morbidity and mortality. In this study, the prevalence of MNM was high implying inadequate quality of obstetric care. The main underlying causes were complications associated with caesarean section, hypertensive disorders of pregnancy and maternal anemia. The most frequent signal functions used to avert maternal death was parenteral antibiotics, blood transfusion, caesarean section and magnesium sulphate. Severe maternal morbidity and mortality can be reduced by mobilizing additional resources to strengthen health systems, improving access to high-quality obstetric care and training healthcare providers to prevent and treat pregnancy and childbirth complications.

Table 2. Access to Obstetric Care and Information

Variable	Frequency (n)	Percentage (%)
Possession of active NHIS card during pregnancy		
Yes	411	98.80
No	5	1.20
Distance from house to nearest health facility		
Less than 1 km	83	19.95
1 – 5 km	208	50.00
Above 5 km	116	27.88
Don't know	9	19.95
Person who decided place of care during pregnancy		
Husband	245	58.89
Self	147	35.34
Mother-in-law	12	2.88
Health worker	8	1.92
Father-in-law	3	0.72
Brother-in-law	1	0.24
Medium of maternal information to household (multi-response)		
Radio	377	58.81
Television	132	20.59
Social media	87	13.37
Newspaper	12	1.87
Other media	33	5.15
Household ownership of phone		
Yes	402	96.63
No	14	3.37
Household means of calling an Ambulance in an emergency		
Mobile phone	263	63.22
Health staff/CHV	100	24.04
Use of Motorbike	8	1.92
None	45	10.82
Means of transport to health facility during maternal emergency		
Motorbike	212	50.96
Motorking ambulance	144	34.62
National ambulance	2	0.48
Private vehicle	6	1.44
Walking/bicycle	52	12.50

Table 3. Obstetric Characteristics of the Women

Variable	Frequency (n)	Percentage (%)
Parity		
1	113	27.16
2-4	223	53.61
≥5	80	19.23

Gestational age of last pregnancy		
Full term	392	94.23
Post term	16	3.85
Preterm	8	1.92
Final mode of delivery		
Caesarean section	36	8.65
Vaginal delivery	380	91.35
Maternal complications		
No complication	340	81.73
Complication	76	18.27
Sex of baby		
Male	234	54.17
Female	198	45.83
Place of delivery		
Hospital	161	38.70
Health Centre	192	46.15
CHPS Compound	58	13.94
Others	5	1.20
Number of accompanying care givers for delivery		
1-2 caregivers	343	82.45
At least 3 caregivers	57	13.70
No caregiver	16	3.85
Outcome of maternal care		
Alive	416	100

Table 4. Underlying Causes of Maternal Near Miss Events

Underlying causes of MNM	**Frequency (n)**	**Percentage (%)**
Hypertensive disorders in pregnancy[a]	10	21.28
Obstructed labour[b]	2	4.25
Antepartum hemorrhage	2	4.25
Anemia	10	21.28
Ruptured uterus	1	2.13
Abortion complication[c]	1	2.13
Caesarean section[d]	21	44.68
[a]: Severe preeclampsia and eclampsia, [b]: Prolong labour and cephalo-pelvic disproportion, [c]: Septic abortion, [d]: Other indications of caesarean section; fetal distress, cord prolapse, bad obstetric history, poor progress of labour & failed induction of labour.		

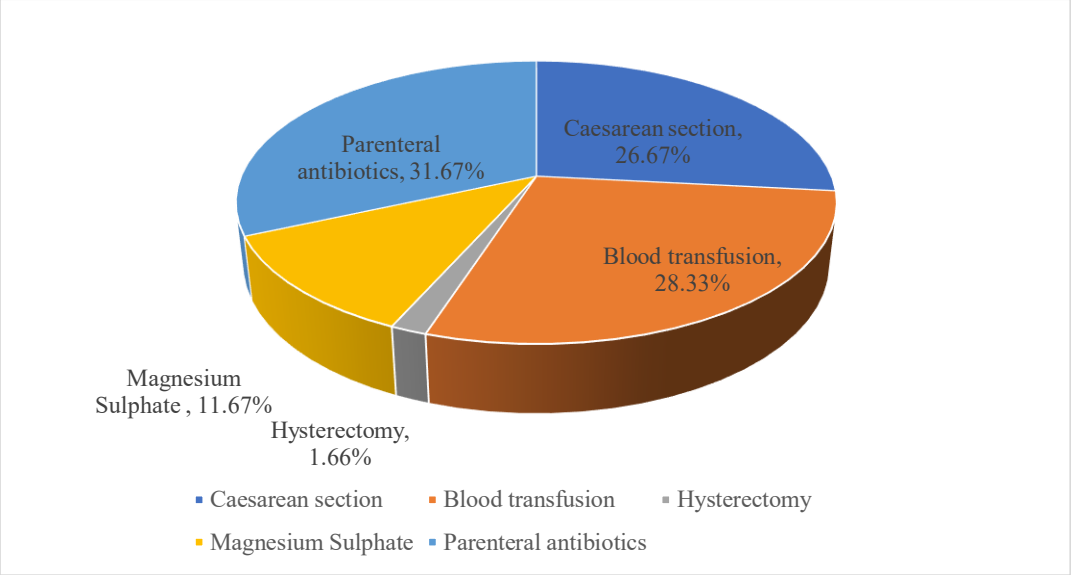

Figure 1. Critical Interventions or Signal Functions Associated with MNM Events

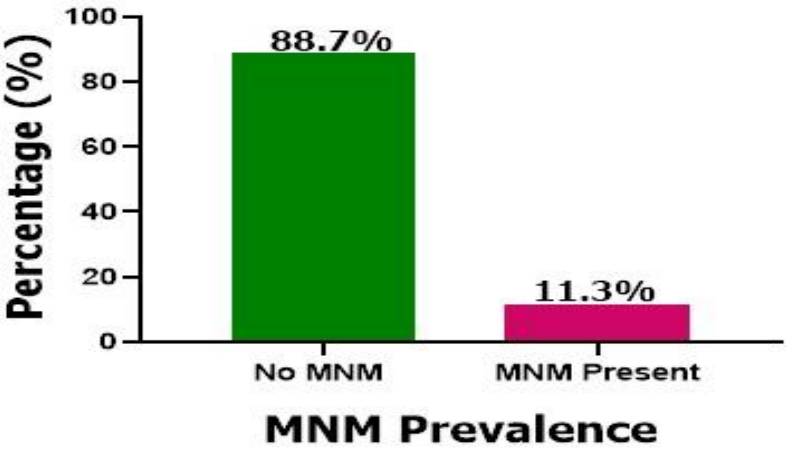

Figure 2. Prevalence of MNM

Table 5. Categorization of MNM

MNM	Frequency (n)	Percentage (%)
Severe pre-eclampsia or eclampsia	5	10.64
Severe pre-eclampsia or eclampsia & caesarean section	5	10.64
Prolong labor, cephalo-pelvic disproportion & caesarean section	2	4.25
Antepartum hemorrhage and caesarean section	2	4.25
Severe anemia + blood transfusion	10	21.28
Caesarean section + postpartum hemorrhage + blood transfusion	1	2.13
Cord prolapse + caesarean section	1	2.13
Emergency caesarean section + blood transfusion and parenteral antibiotics	19	40.42
Ruptured uterus + caesarean section + hysterectomy	1	2.13
Septic abortion + parenteral antibiotics	1	2.13

Declarations

Author Contribution Statement

WKO conceived and designed the study. WKO, POA and BA conducted the study. WKO, POA and BA analyzed and interpreted the data. WKO, BA, POA and JA contributed resources, materials, analysis tools or data. All authors read and revised the manuscript and gave final approval of the manuscript.

Data Availability Statement

The datasets used and analyzed during the current study are available upon reasonable request.

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Ethical Approval

Ethical approval was obtained for the study with number GHS-ERC:016/01/22 from the Ghana Health Service Ethics Committee.

Declaration of Interest Statement

The authors declare that they have no competing interest.

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The Impact of the Social Classroom Contract on Students with Learning Disabilities

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Abstract

This study explores how social classroom contracts impact students with learning disabilities. The way that students behave and interact has a direct bearing on how they are taught and learned. The research uses a quantitative method to identify the elements influencing the formation of classroom social contracts, explore how they relate to the student code of conduct, and emphasize the beneficial effects of classroom social contracts for students with learning disabilities. The research shows that giving students a choice and a voice in establishing a social contract in the classroom empowers them to take charge of their education and recognize their potential to make a difference. The student code of conduct, a set of rules and expectations for behaviour in the school setting, is also strongly tied to the classroom social contract. Additionally, classroom social contracts give students a stronger feeling of independence and accountability, promoting a socially conscious and active learning environment. This study emphasizes the transformative potential of social classroom contracts for students with learning disabilities with the possibility of increasing their attendance, engagement, and achievement.

Keywords: *Achievement, Attendance, Code of Conduct, Student Engagement, Voice, and Choice.*

Introduction

Because today's youth are getting ready to compete with students worldwide, education in the twenty-first century has evolved into a global endeavour. The calibre of education that the current educational system provides will significantly impact the future economy. Therefore, each nation's achievement and graduation rates must be comparable to those of other developing nations worldwide.

According to UNESCO [1], the lower and upper secondary education global adjusted net attendance rates were 65% and 52%, respectively 2021. In 2020, 90% of the world's population had finished primary school, but only 66% had finished secondary school. For students attending public high schools in the United States, the adjusted cohort completion rate for the 2018–19 school year was 86%. Maryland specifically had an 86.9% graduation rate, but the percentage of students with disabilities who graduated was lower at 65.8%. However, despite these graduation rates, academic achievement among U.S. students still lags that of many other nations.

According to data from the Organization for Economic Co-operation and Development (OECD) [2], the United States is in the middle of the rankings globally regarding reading, science, and math. In reading, math, and science, the United States placed 11th, 29th, and 16th out of 79 nations studied for the 2018 Program for International Student Assessment (PISA).

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In addition, the United States was ranked 8th in science and 15th in math for the fourth grade in the 2019 Trends in International Mathematics and Science Study (TIMSS). Out of 46 nations tested in eighth-grade math and science, the United States ranked eleven.

The U.S. Department of Education's 2022 report card [3] reveals a substantial achievement gap between learners who have disabilities and their peers. The National Assessment of Educational Progress (NAEP) 2022 reading assessment report revealed that 70% of fourth graders with specific learning disabilities (SLD) performed below the basic reading level, with only 11% reaching proficiency or above. In comparison, 38% of students without disabilities scored below basic, while 37% were proficient or above. Similar patterns were observed in math assessment, with 53% of students with a learning disability (SLD) performing below basic and only 3% reaching proficiency, compared to 20% below basic and 8% proficient for students without disabilities.

This achievement gap persists throughout eighth grade, with 72% of students with disabilities performing below basic math compared to 33% of those without disabilities.

To increase graduation rates and narrow the achievement gap, schools need to adopt more strategic approaches to engaging students with learning disabilities. Rice and Kipp (2019) [4] suggest that promoting and sustaining the engagement of students with disabilities may require additional strategies and support compared to those implemented for students without disabilities. Research has shown that students who enjoy school and actively engage in classroom activities are likelier to persist in their studies and graduate successfully [5, 6]. Cook-Sather [7] argues that soliciting student voices can foster engagement, develop democratic-minded students, and challenge existing power structures in traditional education.

Furthermore, involving students in their learning encourages collaborative learning, active participation, learner autonomy, and student achievement [8, 9]. Using classroom contracts is one effective approach to soliciting students' voices and promoting engagement. Teachers and students take responsibility for their actions by deciding on the classroom rules together. Classroom agreements ensure that rules are clear, include consequences rather than punishments, permit flexibility based on the class's needs, protect students' dignity, and improve communication [10].

Creating a social contract within the classroom is an effective way to demonstrate to students that everyone belongs. The Classroom Social Contract, as promoted by Capturing Kids' Hearts by The Flippen Group [11], aids students in feeling heard, seen, and valued as members of the learning community. According to Brené Brown [12], we rely on authentic connections to thrive as social beings. Students in our classrooms yearn for connection with their teachers and peers. Feelings of loneliness, elevated levels of the stress hormone cortisol, and a heightened affective filter can all result from a lack of genuine connection.

Learning, problem-solving, and creativity are all hindered when the affective filter rises and cortisol releases [13]. To establish a secure environment where students feel like they belong, the Social Contract is the first step. This safe environment is crucial because it allows students to take risks and make mistakes, which frees up their minds to learn academic material and develop their language skills [12]. It is important for kids to feel like they belong and have a safe place to relax. A sense of belonging can alter the course of their lives. There is little room for effective learning if a student's mind is preoccupied with self-protection, worrying about fitting in, fearing ridicule, or harbouring anger toward peers.

While many researchers have investigated the challenges faced by students with disabilities, few studies have explored the

necessary factors for building a social contract and their connection to a student code of ethics. Likewise, none of the studies have examined the significance of classroom contracts specifically for students with learning disabilities. As schools are evaluated based on student performance and graduation rates, addressing this sociological issue becomes crucial for all educational institutions. School leaders should explore diverse approaches to engage students and foster accountability. Student behaviour and interaction directly impact the teaching and learning process. For students with learning disabilities, learning in a chaotic environment becomes exceedingly challenging.

Therefore, this study aims to assess the impact of social classroom contracts on students with disabilities to improve their success in the classroom. This study focuses on the following research questions: a) What are the essential factors in building social contracts in the classroom? b) How is the student code of conduct related to classroom social contracts for students with learning disabilities? c) Why is it imperative to create classroom social contracts? The study is limited to exploring the effects of social classroom contracts on diploma-seeking students with learning disabilities, who must meet graduation requirements but require specialized instruction and accommodations. However, it lacks a comparison group of non-disabled students or classrooms without social contracts. Future research should include a broader range of students with disabilities and suitable comparison groups to better evaluate the efficacy of social contracts. Social classroom contracts can support student codes of conduct, improve attendance, increase engagement, and enhance achievement. However, educators must consider the unique needs of students with learning disabilities and continuously evaluate and refine social classroom contracts for optimal effectiveness.

The significance of understanding the impact of social classroom contracts for students with learning disabilities lies in the fact that these contracts promote engagement, foster a sense of belonging, strengthen classroom community, enhance communication, and foster student accountability. By implementing effective social contracts, schools can create an inclusive and supportive environment that empowers students with disabilities to thrive academically and personally. Classroom social contracts can increase school attendance, achievement, and engagement.

Materials and Methods

Design of the Study

The study's design was quantitative, and the researchers used Google Forms to administer a questionnaire survey that allowed for simple data retrieval and direct analysis. By using Google Forms, responses were recorded accurately.

Sample

The study involved 28 Reginald High School teachers working with students with learning disabilities during the 2022–2023 academic year. The selection of teachers who actively interact with students with disabilities was done via purposeful sampling. All participating teachers had completed Capturing Kids' Hearts training, fostering social contracts with students.

Data Gathering Procedure

Teachers of students with disabilities received a survey and consent form from a researcher via Google Forms. Participants were chosen to participate after being informed of the study's goals. The participants answered the survey, and data was gathered through Google Forms.

Data Analysis

The collected items were presented in tables and percentages, translated into a chart,

allowing the researchers to identify the factors needed in building a classroom social contract, determine the relationship between the classroom social contract and the student code of conduct, and assess the impact of classroom social contracts on students with disabilities.

Ethical Considerations

Participants were given an orientation explaining the purpose of the study, the methods used to collect the data, and how the data would be used. The Participants must check a box at the start of the survey to indicate their consent.

Those who declined were directed to the questionnaire's final section, while those who agreed answered the questions. There were no dangerous or life-threatening procedures used in the study that might have harmed the participants. By omitting personal identifiers from the survey, the researchers protected the participants' privacy and confidentiality. Additionally, the data were kept private, and after data collection, only the researchers had access to the study and results.

Results

Essential Factors in Building Classroom Social Contracts (CSC)

The figure 1 highlights the essential factors required in building classroom social contracts for students with learning disabilities. It demonstrates that the top priority, at 100%, is considering student choices and voices in creating these contracts. Following closely at 78.6% is the clear definition of classroom social contracts. Ranking third, with 71.4%, are behaviours such as addressing appropriate language, student efforts, listening, and no put-downs, which are given significant consideration during the initial contract-building process.

The two least considered elements are the required number of items (10–25) in a social classroom contract, with only 35.7% of responses, and providing processing time, which garnered 50% of responses.

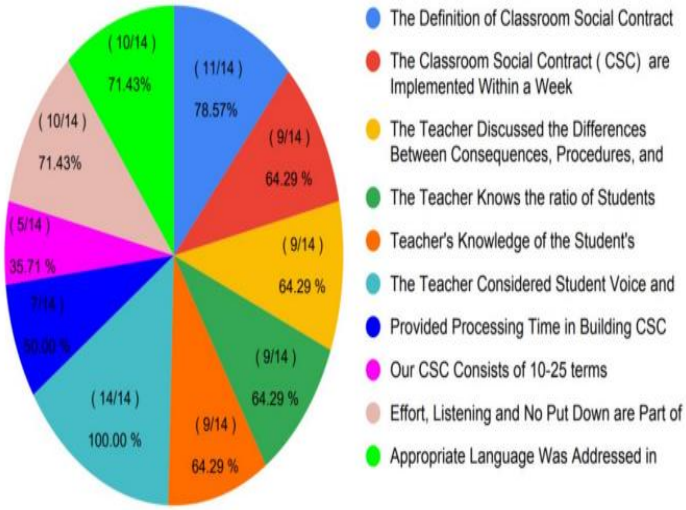

Figure 1. Essential Factors in Building Classroom Social Contracts (CSC)

Relationship of the Student Code of Conduct to the Classroom Social Contract (CSC)

All the respondents agreed that the student code of conduct and the classroom social contract are related. They also added that their consequences for misbehaviour are aligned with the CSC. The link between the student code of behaviour and the classroom social contract is broken down in the above figure. Classroom disruption and disrespectful behaviour are the

most related behaviours addressed in the classroom contract, with 92.9%. Next is bullying, which includes cyberbullying, with 71.4%. Class cutting, attacks on students, and defiance of authority rank third with 57.1 %.

Behaviour from the student's code of conduct with a minor link to the classroom social contracts is hallway misbehaviour at 35.7%, followed by harassment at 42.9%, and academic dishonesty, which is within 50 %.

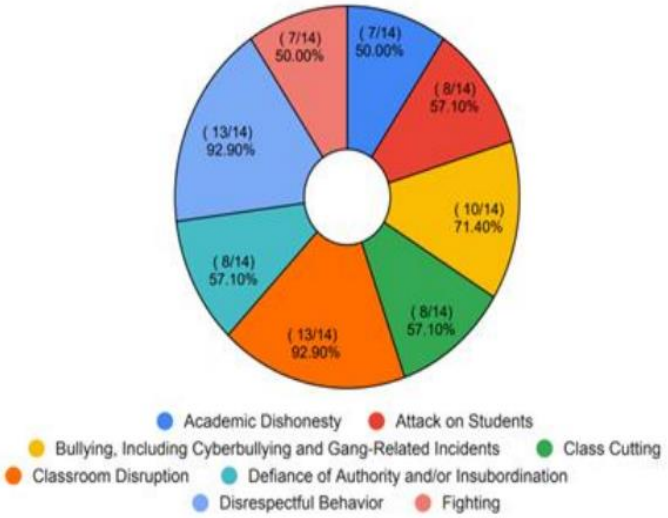

Figure 2. Relationship of the Student Code of Conduct to the Classroom Social Contract (CSC)

Benefits of the Classroom Social Contract (CSC)

Based on the above figure, holding the student accountable has the highest impact (92.86%). Foster community in the classroom and strengthen school engagement; provide structure; and let students know the expectations and the consequences if they do not follow. This ranks second with 85.70%. Lastly, helping students feel heard, seen, and valued is on the third rank, with 78.57%.

Regarding the impacts on the lowest rank, help them understand their disability more because they set expectations based on what they have ranked first with (57.14%). Giving them choices or the freedom to choose classroom expectations, promoting self-directedness, and establishing basic, inalienable rules rank second to last at 64.29%.

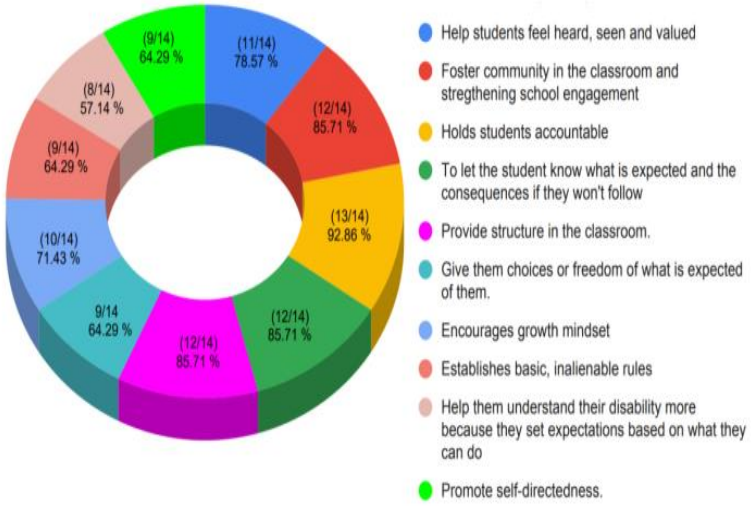

Figure 3. Benefits of the Classroom Social Contract (CSC)

Discussion

The research findings identified the essential factors for building classroom social contracts for students with learning disabilities. These factors include incorporating student choices and voices, providing explicit definitions of the social contract, addressing inappropriate language, emphasizing student efforts, promoting active listening, and prohibiting put-downs [11, 14-17].

Takila, a teacher from Haines Elementary School, emphasized that students feel empowered when they have a voice and choice in creating social classroom contracts. This empowerment enables them to work collaboratively, monitor their interactions, and build rapport with their classmates and teachers. In addition, when students are actively involved, agree to, and sign the contract, they become responsible for committing to its principles [14]. Smith [15] highlights the importance of explaining the social contract to students. Giving students ownership of the contract by explaining that it is an agreement on how they can make the classroom a great place to learn and have fun can foster a meaningful and student-led classroom contract. Students are more likely to adhere to the rules when they understand the purpose behind them. According to Flippen [11], an effective social contract in the classroom should include three key elements: effort, listening, and no put-downs. Students should demonstrate effort in abiding by the agreement, learn to actively listen to others, and refrain from using inappropriate language or humiliating their classmates. Krupansky [17] adds that consent is vital for a social contract to be effective. In the classroom, students should willingly consent to and abide by the social contract to maintain order and create a conducive learning environment.

The findings also reveal that classroom disruption and disrespectful behaviour, bullying, which includes cyberbullying and class cutting, attacks on students, and defiance of authority, are the behaviour in the student code of conduct related to creating and implementing the social classroom contract. It implies that the social contract supports the implementation of the code of conduct. Classroom A social contract ensures students understand the school's expectations and consequences [18]. This suggests that integrating the student code of conduct with the classroom social contract emphasizes the classroom social contract's function as a useful instrument for translating general behavioural norms into concrete, actionable terms. Students can better comprehend the real-world applications of these expectations in their everyday interactions when the social contract and the code of conduct align [19]. This thorough approach promotes a favourable learning environment for all students by preventing misconceptions and promoting clarity about the possible implications of their conduct. Furthermore, this approach encourages students to take ownership of their actions and promotes a sense of responsibility. It also allows for open communication and collaboration between students and teachers, creating a positive and respectful classroom culture.

As a final finding, the study shows that social contracts in the classroom benefit students with disabilities. They provide structure, hold these students accountable for their actions, promote a sense of community in the classroom, increase school engagement, and inform the students at the school's expectations and consequences. This is especially important because students with disabilities may benefit from clear behavioral guidelines that create a welcoming and inclusive learning environment [20]. Everyone has a voice and a stake in preserving a positive classroom environment when students are involved in the social contract's creation [21]. In addition, Gordon [22] emphasizes the significance of student accountability in the classroom, emphasizing the critical role that social contracts play in

educating students about expectations and holding them accountable for their actions. Social contract implementation not only fosters a culture of accountability but also improves classroom management, reduces misbehavior, and increases the possibility of productive instructional time [23; 22]. As a result, by actively influencing social contracts and behavioral norms, students help create an environment that fosters personal and academic growth.

Conclusion

The present study explores the impact of classroom social contracts on students with disabilities, specifically focusing on enhancing their success within the school setting. This investigation focused on the following questions: a) What are the essential factors in building social contracts in the classroom? b) How is the student code of conduct related to classroom social contracts for students with disabilities? c) Why is it imperative to create classroom social contracts?

The study reveals the essential factors in building classroom social contracts: considering student voice and choice, clearly defining classroom social contracts, and addressing behaviours such as appropriate language, student efforts, listening, and no put-downs. The study also reveals that all teachers agreed that a direct relationship exists between the student code of conduct and the classroom social contract. Classroom disruption and disrespectful behaviour are the most related, followed by bullying. Class cutting, attacks on students, and defiance of authority are among the top-ranked codes of conduct related to classroom social contracts.

Lastly, the study highlighted that the classroom social contract benefits the school environment. The top benefits are holding the student accountable, fostering community in the classroom, strengthening school engagement, providing structure, letting the student know the expectations and the consequences if they do not follow, and helping students feel heard, seen, and valued.

Developing a classroom social contract must be based on the voices and decisions of the students. Instead of the teacher listing and enforcing posted rules throughout the classroom, it is the 21st-century method of enforcing proper behaviour. A social contract for the classroom is an agreement on how to act and treat other students in the community. It is the fundamentals and rules of social behaviour. The list that students produce is brief, accessible, and written. The student's code of conduct is defined and moulded by the school. Policies outline sanctions for behaviours that are considered unacceptable in the discipline. Implementing the code of conduct is strengthened by social contracts in the classroom. A social contract in the classroom for students with disabilities must be clear and simple to be effective. They ought to be involved in the creation of social classroom contracts. Social contracts in the classroom have many positive effects. They give students more power by fostering a sense of ownership and accountability for their actions. Additionally, these agreements promote a supportive community in the school environment, where respect for one another governs interactions. As a result, student engagement increases, enhancing learning opportunities and academic achievements.

The inclusion of student perspectives as respondents in future studies is recommended. In-depth knowledge of the intricacies surrounding the implications of social classroom contracts can be gained through interviews, which can be used with questionnaire surveys. It is likely to enhance and increase the effectiveness of social contracts in school environments by involving students as active participants in the research process. The significance of the study's findings is outlined in this section, which also underscores the rationale for the study and its practical benefits and extensions.

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Conflict of Interest

There are no declared conflicts of interest in this work by the authors.

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COVID-19 Vaccination Uptake and Its Effect on Morbidity and Mortality among Frontline Healthcare Workers in Kaduna State, Nigeria

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Abstract

The COVID-19 pandemic has placed tremendous burdens on healthcare workers (HCWs), accounting for over 1.4 million HCW infections and 10% of global fatalities. HCWs faced elevated infection risk, psychological distress, long working hours, fatigue, stigma, and violence. While vaccines are pivotal in reducing severe illness, HCW vaccine hesitancy, given their role as advocates, jeopardizes vaccination coverage global goals and healthcare systems. Addressing this vaccine uptake is imperative through education, transparent communication, and support to safeguard HCWs' safety and pandemic containment. This study assessed COVID-19 vaccination uptake among frontline HCWs in Kaduna State, Nigeria, and its impact on morbidity and mortality. Utilizing a descriptive cross-sectional approach, we analyzed secondary data from the Surveillance Outbreak Response Management and Analysis System (SORMAS). The study encompassed HCWs in Kaduna State, excluding pregnant and lactating individuals, following national guidelines. Among 8095 HCWs tested for COVID-19, most were aged 31-40 years (35%), female (60.2%), and urban residents (70.3%). COVID-19 vaccination uptake was low at 17.4%, with 82.6% unvaccinated. COVID-19 infection was significantly associated with vaccination ($p = 0.039$). Although unvaccinated participants exhibited a higher mortality rate (60%) than vaccinated ones (40%), this difference was not statistically significant ($p = 0.209$). In conclusion, this study unveiled insufficient vaccination uptake among HCWs, potentially impeding pandemic response. While vaccination seemed to positively impact disease outcomes, it didn't

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significantly affect the infection risk. Addressing HCW vaccine hesitancy remains critical for achieving immunization goals and ensuring healthcare system safety.

Keywords: *Covid-19, Vaccines, Vaccination uptake, Healthcare workers (HCW), Infection.*

Introduction

The Corona Virus Disease (COVID-19) pandemic was a serious health challenge that infected millions of individuals and killed hundreds of thousands, affected people's and communities' economic and social well-being, disrupted livelihoods, affected trade, increased the fiscal deficit and monetary burden, increased the risk of macroeconomic instability, decreased migration and remittances, decreased income from travel and tourism, and led to a decline in micro, small, and medium-sized industries and informal businesses [1, 2].

The world is yet to recover from the devastating impact of this dreaded pandemic. HCWs were on the frontlines of supporting the response to control the pandemic; therefore, they were not only at great risk of contracting this infection but also passed through psychological distress, long working hours, fatigue, occupational stigma, and physical violence [3, 4] This led to a rise in the HCW infection rate before the availability of COVID-19 vaccines [5] The introduction of various vaccines with varying levels of efficacy brought the promising hope of bringing the spread to a halt, and since the frontline HCWs were highly vulnerable, they were prioritized among the first eligible beneficiaries of these vaccines [6-8].

Corona virus (COVID-19) is an infectious disease caused by a virus in the family Coronaries. These viruses cause mild to severe respiratory illnesses ranging from the common cold to severe acute respiratory syndrome (SARS-CoV) and Middle East respiratory syndrome (MERS-CoV) [9, 10] The viral infection was first reported to World Health Organization (WHO) on December 31, 2020, in a group of patients with unknown pneumonia in Huanan, South China Seafood Market Wuhan, Hubei Province, China [11]. The precise zoonotic (animal) origin of the 2019 nCoV is still uncertain. The virus has been identified in environmental samples from a live animal market in Wuhan, and some human cases have been epidemiologically linked to this market [12, 13] The virus is zoonotic and is believed to have been transmitted from civet cats, bats, and raccoon dogs to humans. Human-to-human transmission has also been documented [11]. The species of COVID-19 isolated in humans was identified as a novel coronavirus and designated as 2019-nCoV [14]. After genomic sequencing, it was genetically related to the coronavirus outbreak responsible for the SARS outbreak of 2003; therefore, the virus was named severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) by the International Committee for Taxonomy of Viruses [10, 15].

Vaccines are a game-changing tool in the fight against the pandemic, preventing people from getting seriously ill or dying from COVID-19 [16] Several safe and effective vaccines are being manufactured globally. As of January 14, 2022, there were 333 vaccine candidates in development, of which 139 had entered the clinical phase. In total, 330 vaccine candidates are in various stages of development, with 102 in clinical research, including 30 in Phase I trials, 30 in Phase I–II trials, 25 in Phase III trials, and 8 in Phase IV development [9, 17, 18]. Prior knowledge of the structure and functions of other coronaviruses (MERS-CoV and SARS-CoV) helped to expedite the process of COVID-19 vaccine production, and the vaccines are widely credited for their role in reducing the spread, severity, and death caused by COVID-19 [19]. The vaccine is meant to be used in addition to other preventive measures that include avoiding overcrowded places, maintaining social distancing, regular handwashing with

soap and water for at least twenty seconds, wearing a mask in public, staying at home, ensuring good ventilation in closed spaces, managing potential exposure durations, practicing good respiratory hygiene, and avoiding the touching of mucosal areas such as the eyes, nose, or mouth with unwashed hands [20]. HCWs are exposed to patients and/or their blood or body fluids. This occupational exposure to blood and body fluids is a serious concern and presents a major risk for the transmission of infectious diseases [21]. This exposes them to the likelihood of getting infected or even transmitting the infection to the patients and other family and community members [22].

COVID-19 has impacted almost every country and territory in the world. Globally, the rate of infection among HCWs rose along with the number of infections among the general population. As of May 15, 2022, over 521 million cases of COVID-19, including 6,266,324 deaths, have been documented by WHO worldwide, with Europe and America being the continents worst hit by the pandemic, recording 218,268,130 and 154,826,856 cases, respectively, with over two (2) million deaths from each of the continents. Africa was least affected, recording only 8,901,606 cases and 172,094 deaths. The United States of America (USA) alone accounted for 16% of all global cases, followed by India, Brazil, France, Germany, and the United Kingdom, which all recorded more than twenty million (20,000,000) cases each. In terms of deaths, the USA had the highest mortality rate of 992,289. Brazil and India also recorded more than half a million deaths each, followed by the Russian Federation, Mexico, and Peru, with deaths ranging from two hundred thousand (200,000) to four hundred thousand (400,000). Nigeria recorded over 250,000 cases and over 3,000 deaths.

Healthcare workers accounted for more than 1.4 million of the COVID-19 infections worldwide, and they also accounted for at least 10% of all fatalities. The African Regional Office of the WHO in Brazzaville stated that approximately 110,072 HCW in Africa were infected with coronavirus, with about 10% of them succumbing to the infection. 570,000 healthcare workers were infected with COVID-19, according to the WHO Pan American Regional Office in Washington, DC, and 2500 of them died as a result. HCW infections in America and Europe were 475,565 and 186,824, respectively, while 2586 and 288 deaths were also reported [23].

The epidemic also revealed the weaknesses in our healthcare systems. The number of coronavirus cases overwhelmed the health systems all around the world, and even the most developed and well-prepared nations struggled. Millions of people, including healthcare workers, did not have access to an uninterrupted supply of materials for infection prevention and control or other vital life-saving equipment like test kits, face masks, and respirators in the most vulnerable nations. The lockdown and long hours at work exposed the HCWs to psychological effects, burnout, and post-traumatic stress disorder (PTSD), extreme fear and uncertainty, negative societal behaviors motivated by fear, and distorted perceptions of risk, including distress reactions, insomnia, rage, and extreme fear of illness even in those not exposed, as well as other health risk behaviors such as increased use of tobacco, alcohol, and other drugs [24]. Even though the virus has continued to mutate, the COVID-19 vaccines serve as a first line of defense and are still quite effective in lowering serious morbidity and mortality. To stop and recover from the pandemic, the WHO set a global goal in 2021 of immunizing 70% of the population worldwide. Only 52 countries have reached that goal, while 69 more have not yet reached the interim goal of 40% coverage, with 21 of them having not even reached 10% coverage. Significant coverage disparities for the COVID-19 vaccination, especially in nations with low coverage rates, pose a risk to a sustained economic recovery and the achievement of herd immunity. Worldwide, more than 11.3 billion doses of the COVID-19

vaccine have been given, resulting in 58 percent of the population receiving their first shot. However, just 11% of people in low-income countries are immunized, compared to 73% of people in high-income nations. Africa's aim is to vaccinate at least 20% of the population by providing up to 600 million doses by the end of 2021, prioritizing HCW and other vulnerable groups. Vaccination coverage in Africa ranges from 0.13 per 100 population in Burundi to 224 per 100 population in the Seychelles, with a continent average of 38 per 100 population.[25] 50,619,238 doses have been given since the vaccination programme began in Nigeria on March 5th, 2021, with 28,340,766 people receiving at least one dose of the vaccine and 20,986,761 people receiving all two to three doses. The coverage for Nigeria is 25 vaccine recipients for every 100 people who are eligible [26]. Healthcare workers (HCWs) are prone to vaccine hesitancy, which is a global public health issue that could jeopardies immunization goals [6]. HCWs are important vaccine advocates, and their hesitation could result in unvaccinated HCWs working with patients who could endanger them, other HCWs, and the healthcare system [6]. Prior to the COVID-19 pandemic, HCWs had vaccine hesitation that was primarily focused on the influenza vaccine. HCWs' knowledge of and perception of personal danger from illnesses may have an impact on their vaccine reluctance. Studies have also documented the poor knowledge of HCWs about respiratory diseases like tuberculosis [27]. Measles, tetanus, and hepatitis B vaccines, among others, are frequently better absorbed by HCWs than by the public. HCWs may not, however, always consider the hazards to their patients when determining whether to get vaccinated [6]. Infodemics, vaccination efficacy and safety worries, and medical skepticism all contribute to vaccine hesitation [28]. They also must have access to immunizations and treatments. Distrust in the medical community is widespread, ingrained, and probably justified. Skepticism about the intentions of vaccine manufacturers and public health officials was also fueled by inequities in the distribution of vaccines around the world, especially among immigrants concerned about friends and family members in nations with insufficient vaccine supply [28]. Understanding the root causes and effects of vaccine reluctance is essential to finding solutions [29]. The hesitation to get vaccinated may be impacted by things like complacency, convenience, confidence, and shared responsibility. Understanding the causes of vaccine reluctance, eliminating misinformation, and fostering faith in vaccines and medical professionals are all important components of combating vaccine hesitancy [29]. Achieving vaccination goals also depends on ensuring vaccine equity because some black or African American and Hispanic or Latino people are less likely to receive the COVID-19 vaccine due to barriers like vaccine access and medical mistrust. Efforts to maintain sufficient levels of current vaccination must consider the needs of all communities to guarantee fair and just access to COVID-19 vaccination [29, 30].

Several COVID-19 vaccines have been approved for use worldwide. As of May 16, 2022, about 11.8 billion vaccine doses had been delivered. In comparison to the general population, HCWs had a risk of infection that was more than three times higher. When the World Health Assembly's Seventy-third Session declared 2021 to be the International Year of the HCWs in November 2020. It acknowledged worries about the pandemic's wider effects on HCWs as well as their crucial role at the forefront of the response [31]. Soon after, the WHO began a global campaign in support of the International Year [32]. The campaign's goals include an emphasis on preventing harm to HCWs, stressing the importance of HCWs being vaccinated against COVID-19, demanding the measurement of all COVID-19-related infections and deaths among HCWs, and emphasizing the necessity for global governance to agree on a worldwide response. It stressed the importance of global governance agreeing on a

compact that preserves the duty-of-care paradigm. National authorities may only implement appropriate policy measures and responses to lower the risks of infection and death for HCWs by tracking the number of vaccines delivered, infections, and fatality rates, particularly among professions, with an emphasis on HCWs. It is critical to guarantee the safety of health-care workers (HCWs) not only to provide ongoing patient care but also to ensure that they do not become sources of spread. This study aims to assess the uptake of the COVID-19 vaccination and its effect on morbidity and mortality among frontline healthcare workers in Kaduna State, Nigeria.

Methods

Geographical Location: Kaduna State is situated in the North-West geopolitical zone of Nigeria. It shares borders with several other Nigerian states and the Federal Capital Territory [31].

Land Area: The State covers an area of 46,020 square kilometers, making it the 12th largest State in Nigeria by land area [33].

Climate and Geography: Kaduna State features Sudan Savannah vegetation with distinct wet and dry seasons. It experiences average maximum and minimum temperatures of 15.1 and 35.18 degrees Celsius, respectively. The annual rainfall is approximately 1,524 millimeters, with a humidity level of 56.64% [33].

Population: As of 2022, Kaduna State had an estimated population of 9,735,051 people, distributed across 255 wards and 23 Local Government Areas (LGAs). The State serves as a major commercial and transportation hub for northern Nigeria [33].

Healthcare System: The healthcare system in Kaduna State is pluralistic, involving both public and private sectors, as well as modern and traditional practices. The government is responsible for secondary-level care, while Primary Healthcare (PHC) services are managed by LGAs. There are a total of 1,983 health institutions in the State, primarily owned by the government (85.8%) and private entities (34.2%).

Sample Size: The review targeted the total population of HCWs in the State that were tested for COVID-19 at any time within the review period of this study and those HCWs that had received the COVID-19 vaccination.

Study Context: This study assessed the uptake of COVID-19 vaccines by HCWs following the vaccine introduction. It is a descriptive, cross-sectional study where data from a secondary source; the Surveillance Outbreak Response Management and Analysis System (SORMAS), from the onset on the pandemic to 29th August 2022 was exported and evaluated to provide a snapshot of the vaccine uptake. The study population were healthcare workers in Kaduna State, Nigeria, excluding pregnant and lactating mothers who, as of the time of the study, were not eligible for the COVID-19 vaccination according to the national guidelines.

Data Sources and Analysis: The Nigeria Centre for Disease Control (NCDC) manages disease surveillance and response, while the National Primary Healthcare Development Agency (NPHCDA) manages vaccinations. The NCDC domiciled all electronic data for disease surveillance and response on the SORMAS. The SORMAS contains patient-level data details, from when a patient is suspected to when tested, treatment provided and follow-up, laboratory investigations conducted with results, and contact investigations carried out. This study exported data from SORMAS and reviewed it. The Electronic Management of Immunization Data (EMID) platform had incomplete data due to technical issues so daily call-in data were relied upon. Data analysis was performed using SPSS version 25, and results were presented through tables, graphs, and charts.

Results

Sociodemographic characteristics of the study participants

Table 1. Sociodemographic Characteristics of the Study Participants

Variables	Frequency (n = 8095)	Proportion (%)
Age		
≤20	152	1.6
21-30	2293	24.5
31-40	3317	35.5
41-50	2151	23.0
51-60	1316	14.1
>60	126	1.3
Gender		
Male	3725	39.8
Female	5630	60.2
Educational Status		
None	10	0.1
Primary	65	0.7
Secondary	690	7.4
Tertiary	8415	90.0
Others	175	1.9
Residential Area		
Urban	6673	71.3
Rural	2682	28.7
Mean Age	**Mean ± Standard Deviation**	-
	38.38 ± 10.50 years	-

The ages of study participants ranged between 15 and 115 years, with a mean of 38.38 ± 10.5 years. The dominant age group was the 31–40-year age group, which constituted 35% of the study subjects. About two-thirds of the study participants, 5630 (60.2%), were females, and the majority, 6673 (70.3%), lived in urban areas. [Table 1]. The trend of COVID-19 infection among HCWs in Kaduna State Nigeria.

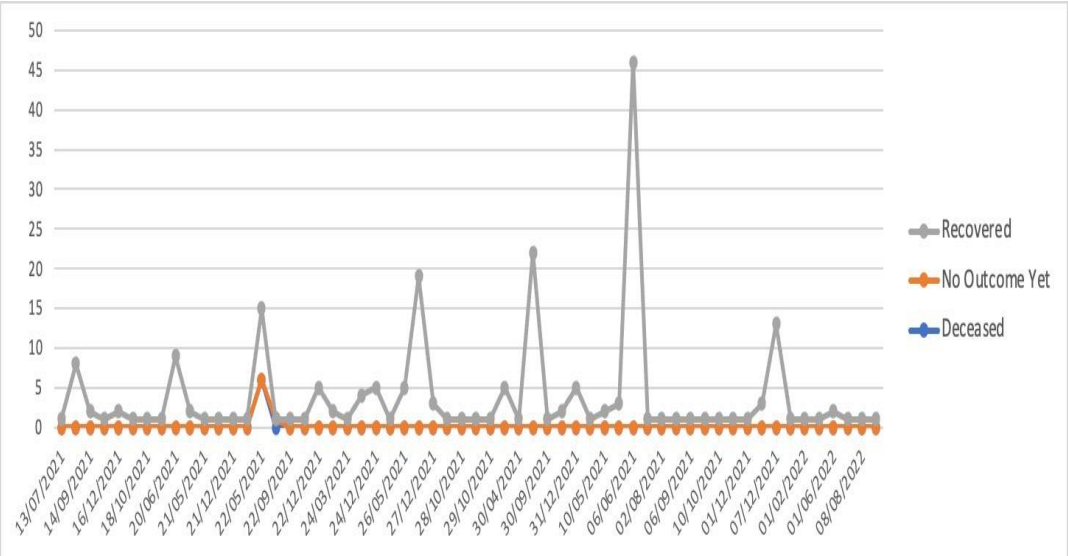

Figure 1. The Trend of COVID-19 Infection amongst HCW in Kaduna State Nigeria

The figure 1 shows the trend of COVID-19 infection among HCWs in Kaduna State Nigeria. The various spikes represent periods where active screening is conducted targeting HCWs in the various health facilities in the state as part of efforts by the government to interrupt the transmission of the disease among HCWs.

The figure 2 shows the COVID-19 vaccination uptake among healthcare workers in Kaduna state.

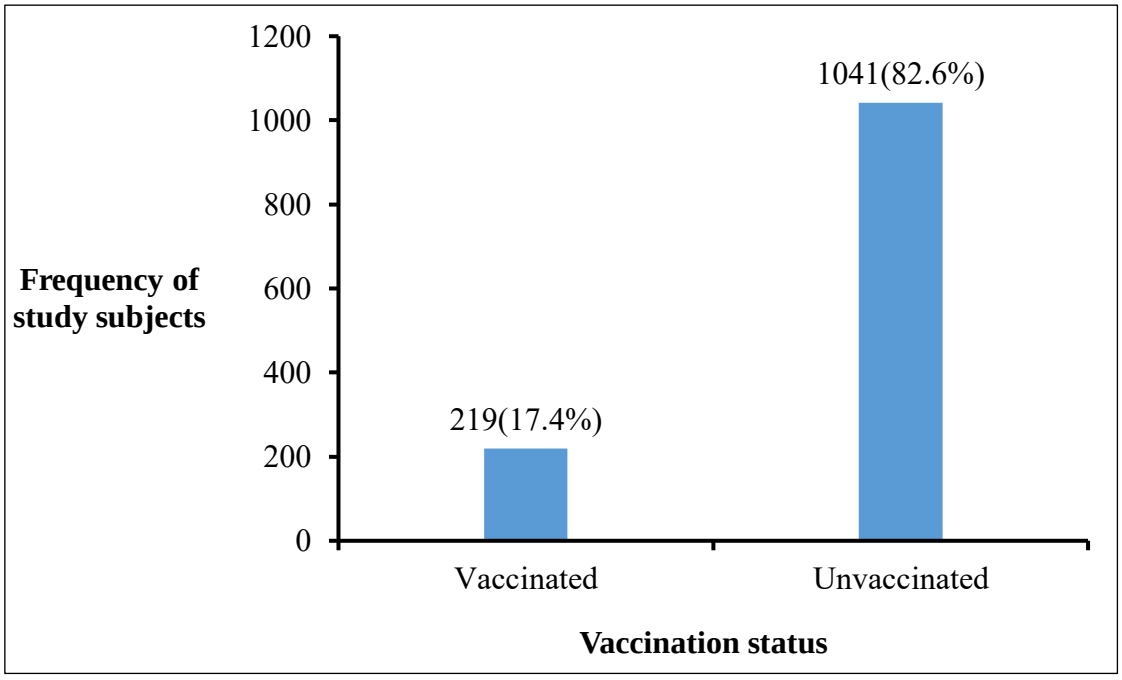

Figure 2. Vaccination status of HCWs in Kaduna state from March 2021 to February 2022

The uptake of COVID-19 vaccination among healthcare workers in Kaduna state was 17.4%. Only 219 (17.4%) of the study participants received the COVID-19 vaccination, while majority of them, 1041 (82.6%), were not vaccinated for COVID-19 [Figure 1].

Effect of COVID-19 vaccination on infection and mortality among HCWs in Kaduna state

Table 2. Effect of COVID-19 Vaccination on Development of COVID-19 Infection among HCWs in Kaduna State

Variables	**COVID-19 case classification**		**Test statistic**	**OR**	**95% CI**	
	Cases (n = 74)	**Non cases (n = 1186)**			**Lower**	**Upper**
	n (%)	**n (%)**	**p-value**			
COVID-19 Vaccination status						
Vaccinated	20 (26.0)	199 (16.8)	$\chi^2 = 4.265$	1.74	1.023	2.962
Unvaccinated	57 (74.0)	987 (83.2)	**p = 0.039**			
χ^2 = Pearson's Chi square test, **OR** = Odds Ratio, **CI** = Confidence interval						

COVID-19 infection seen to have a statistically significant association with COVID-19 vaccination (χ^2 = 4.265, p = 0.039). About 74% of participants with COVID-19 infection were unvaccinated. However, among uninfected population, a larger proportion of them (83.2%) were also not vaccinated for COVID-19 (OR = 1.74, 95% CI = 1.023-2.962).

Table 3. Effect of COVID-19 Vaccination on COVID-19 Related Mortality among HCWs in Kaduna State

Variables	Outcome of cases		Test statistic	OR	95% CI	
	Recovered (n = 1258)	Died (n = 5)			Lower	Upper
	n (%)	n (%)	p-value			
COVID-19 Vaccination status						
Vaccinated	217 (17.2)	2 (40.0)	Fisher's Exact	0.313	0.052	1.882
Unvaccinated	1041 (82.8)	3 (60.0)	p = 0.209			
χ^2 = test, **OR** = Odds Ratio, **CI** = Confidence interval						

A large proportion (82.8%) of HCWs who recovered from the illness were unvaccinated and although participants that were not vaccinated had a higher proportion of mortality (60%) than those that were vaccinated (40%), the difference was not statistically significant (Fisher's Exact test, p = 0.209).

Discussion

The health and safety of the health workforce are critical for an effective COVID-19 pandemic response. This study assessed the uptake of the COVID-19 vaccination and its effect on the development of COVID-19 infection and mortality among frontline healthcare workers in Kaduna State, north-western Nigeria. This study found a considerably low COVID-19 vaccine uptake among frontline HCWs in Kaduna State, like the findings of a previous study on vaccine hesitancy amongst HCWs in Kaduna State by A.K. Koledade et al., 2022, and in Nigeria by Agha et al., 2021. The low COVID-19 vaccine uptake observed in this study may be attributable to variations in the demographic characteristics and educational backgrounds of the participants. Only a few of the respondents were males, aged ≥ 40 years, and with a postgraduate qualification, which, according to Agha et al., 2021, and Nomhwange et al., 2022, are the characteristics reported to be associated with a higher likelihood of accepting the vaccine. Low uptake of COVID-19 vaccines among frontline HCWs may negatively impact the pandemic response since the unprotected frontline HCWs will pose a risk to family members, colleagues, and clients, who will most likely also reject the vaccines. A major limitation, however, was the incompleteness of data uploads on the SORMAS and EMID platforms.

In a study conducted by Koladade et al. in Kaduna state, a total of 351 respondents, predominantly falling within the age groups of 20-39 (53.3%) and mostly male (55.3%), were examined to understand the reasons behind low COVID-19 vaccine uptake among healthcare workers (HCWs). Only 47.9% of the respondents expressed a willingness to accept the COVID-19 vaccine. The primary reasons for vaccine hesitancy among HCWs were as follows; Fear of side effects: A significant proportion (50.0%) cited concerns about potential adverse effects of the vaccine. Lack of trust in the source: Nearly half (47.4%) expressed a lack of trust in the source of the vaccine. Concerns about mRNA components: A substantial number (39.5%) were apprehensive about the mRNA components of the vaccine. The study also identified two factors associated with vaccine hesitancy: Gender: The odds of vaccine hesitancy were lower among males, with an adjusted odds ratio (AOR) of 0.43 (confidence interval [CI] 0.25-0.72), indicating that females were more likely to be hesitant. Cadre: HCWs in certain job cadres were less likely to express vaccine hesitancy, with an AOR of 0.37 (CI 0.14-0.94), implying that individuals in specific roles were less hesitant compared to others. These findings shed light on the challenges faced in promoting COVID-19 vaccination among healthcare workers in Kaduna state. Addressing vaccine hesitancy, particularly among females and specific job cadres, will be crucial for achieving higher

vaccine acceptance rates and ensuring the safety of both HCWs and the broader community. Strategies to build trust in the vaccine source, provide education about vaccine safety, and address concerns about side effects and mRNA components should be considered in public health interventions.

Another important finding of this study is the low prevalence of COVID-19 infection among HCWs with or without vaccination. The vaccinated group had a seemingly better outcome of lower mortality but was not statistically significant ($\chi^2 = 0.008$, $p = 0.929$). This might be attributed to a very small sample of only five mortalities. Nonetheless, the finding was comparable to previous studies in the US. Qatar [34] and Nigeria [35].

Furthermore, similar to other studies [36], a higher prevalence of COVID-19 infection was noted among females, and this could be attributable to the fact that the proportion of female HCWs in the study population is much higher than that of males. Previous studies have always reported a higher risk of COVID-19 infection among males among the general population [37-39].

Evidence suggests that individuals of any age who have underlying medical issues are more likely to contract COVID-19, become unwell, need hospitalization, and die. As a person's number of underlying medical disorders rises, so does their risk of developing severe COVID-19. Because of this, vaccination is highly recommended for them. For those with co-morbidities, COVID-19 vaccinations have been demonstrated to be both safe and effective. As a result, having one or more underlying medical issues should be a further justification for choosing vaccination over delaying it [40-42].

Conclusion

This study looked at the uptake of the COVID-19 vaccine and the effect of the vaccine on infection and mortality among frontline HCWs in Kaduna State, Nigeria. The study showed low vaccination uptake among HCWs, which could negatively impact the overall pandemic response. The study also shows that while vaccination might have some positive effects on disease outcomes, it does not seem to have any effect on the risk of getting infected.

Further studies would be required to conduct qualitative research to complement this quantitative data to explore healthcare workers' attitudes, beliefs, experiences, and determinants regarding COVID-19 vaccination and hesitancy. This can provide valuable insights into vaccine acceptance and hesitancy. Also, to replicate this work among the general population and with a larger sample size, to assess the effect of vaccination on the disease outcome.

Interventions to increase vaccine uptake among healthcare workers and intensified public education on COVID-19 vaccination uptake would be required.

Conflict of Interest

The authors declare no conflict of interest in this work.

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An Assessment of Selected Ghanaian Banks' Internal Control and Corporate Governance

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Abstract

The general objective of the study is to assess the effectiveness of internal control and corporate governance in the Ghanaian banking industry. The study was basically a case study based and was approached quantitatively. Five banks (Absa Bank Ghana, Ecobank, Standard chartered Bank, Agricultural Development Bank, and Ghana Commercial Bank) were sampled for the study. Four hundred (400) respondents from the above sampled banks helped offer meaningful and enough information to answer the study questions. Non-probability sampling was used for this study's sample strategy. The study made use of questionnaires to gather the data. In analyzing the data, the study made use of descriptive statistics, Kendall's coefficient of concordance (w), correlations and regression analysis techniques. The study found that internal controls and corporate governance in the Ghanaian banking industry are effective. The results of the study confirm that internal auditors and staff have the role to review systems established to ensure compliance with policies, procedures, plans, laws, and regulations impacting operations and reports; to detect and prevent illegal practices; to report illegal acts; provide information to management; act with competence; make a report to the company about the problems and follow the corporate policy in ensuring effective internal control in the Ghanaian banking industry.

Keywords*: Compliance, Corporate governance, Corporate policy, Internal Control, Kendall's coefficient of concordance (w).*

Introduction

The centrality of Internal Control and Good Corporate Governance in the sound, sustainable and efficient management of banks has been of prime concern to regulators and managers of the banking system. The Bank of Ghana under the powers conferred thereupon by Sections 56 and 92(1) of the Banks & Specialized Deposit-Taking Institutions Act, 2016 (Act 930) [1], issued the Company Governance Directive, 2018 (CGD 2018) and this applies to Banks, Savings and Loans Companies, Finance Houses and Financial Holding Companies licensed or registered under Act 930. The Bank of Ghana (BOG) issued the Company Governance Directive (CGD) in February 2018 to regulate financial institution governance and management. The Central Bank revoked operational licenses of banks and other non-banking financial entities in large numbers from 2018 to 2019 due to poor internal controls and corporate governance. Bank of Ghana supervises banks and non-banking financial institutions in Ghana. The head of the Banking Supervision Division of the Central Bank is required to inspect banks annually.

The Corporate Governance Directive (CGD) 2018 set criteria for senior management employees and gave the Central Bank control over their selections to increase public confidence in the banking sector. The governance directive specifies the Board of

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Directors' tasks and mandates at least 30% of regulated financial institutions' boards to be Ghanaians. Non-executive directors and board chairpersons can only serve 12 and 9 years, respectively [2]. Effective internal control is a key component of Good Corporate Governance and a secure and stable foundation for banks' operations. Internal controls provide reasonable assurance that certain goals are met, or progress is understood. Strong internal controls and corporate governance help banks meet long-term profitability goals and provide accurate financial and managerial reporting. This method also ensures strict compliance with laws and regulations, reducing the risk of unanticipated losses or reputation damage to institutions.

"The most common explanation for what corporate governance is and how it works is as a system of internal controls. Corporate governance refers to the process through which a company's operations are managed and guided. It is well-known that effective internal controls are essential to good corporate governance. The relevance of internal control to sound management practices is thus called into doubt" [3].

"Since the late 1970s, there has been a significant rise in the significance of disclosing information on internal control" [4]. "The most significant accounting scandals that occurred around the turn of the twenty-first century are responsible for the rise in significance of this topic. As a result of these scandals, there is a pressing requirement to strengthen the quality of internal control and to place increased focus on the function that it plays in the governance of the organization" [5]. Businesses must build internal control measures to protect shareholders. Provide shareholders with a reliable financial reporting system and information on dangers that could derail the company's aims. Annual reports must include information on internal control design and effectiveness since investors may use it to evaluate management. Investors view internal control disclosure as value relevant since it affects capital costs.

"The purpose of corporate governance is to help build an environment of trust, transparency, and accountability necessary for fostering long-term.

investment, financial stability, and business integrity, thereby supporting stronger growth and more inclusive societies" [6]. The Bank of Ghana's Corporate Governance Directive [7] defines Corporate Governance to mean same as by the Bank of Ghana Corporate Governance Disclosure Directive, 2022 " to mean the manner in which the business and affairs of a Regulated Financial Institution is governed by its Board and senior management, including how its strategy and objectives are set; its risk appetite/tolerance is determined; its day-to-day business is operated; interests of depositors are protected and shareholders obligations are met, taking into account the interests of other recognized stakeholders; and aligning corporate activities and behaviors with the expectation that it would operate in a safe and sound manner, with integrity and in compliance with applicable laws and regulations".

The Corporate Governance Code for Listed Companies 2020 SEC/CD/001/10/2020 [8] defines Corporate Governance to have the same meaning as in the Ghana Companies Act, 2019 (Act 992) [9], as amended): to mean the process and structure used to direct and manage business affairs of the company towards enhancing prosperity and corporate accounting with the ultimate objective of realizing shareholders long-term value while taking into account the interest of other stakeholders.

Basel Committee on Banking Supervision (2015) [10] states the definition of corporate governance as: 'A set of relationships between a company's management, its board, its shareholders, and other stakeholders which provides the structure through which the objectives of the corporate are set, and therefore the means of achieving those objectives and monitoring performance. It helps define the way authority is allocated and the way corporate decisions are made'.

"The idea of corporate governance is strongly dependent on the requirement of having effective internal controls. This is since effective internal controls guarantee that processes run as intended and that risk management is carried out. In addition, it is essential to devise plans to ensure that the aforementioned processes will be carried out as planned. These include monitoring by managers to ensure that the appropriate attitudes and behaviors are maintained, as well as a focus on honesty and competence" [11].

Over the course of the last several decades, there has been a significant surge in the significance of corporate governance. Good corporate governance is seen to boost the value of companies because it has the potential to help eliminate agency problems (issues that arise because of inappropriate behavior on the part of business officials) and to build investor trust" [12]. "In addition, there is a common belief that effective corporate governance not only lessens the possibility of fraud and the failure of the company as a whole, but that it also generates wealth by enhancing the company's financial performance" [13]. Its prominence may be attributed to the precarious financial position of a great number of organizations, which has led to their desire to enhance their operations and boost their earnings.

Corporate governance is defined as the structure through which organizations are directed and governed, according to the Organization for Economic Cooperation and Development (OECD). It goes on to state that the corporate governance structure details the allocation of rights and responsibilities among various participants in the corporation, such as the board of directors, managers, shareholders, and other stakeholders. It also outlines the policies and procedures that must be followed in order to arrive at decisions regarding matters pertaining to the operations of the corporation. In addition to this, it offers the framework for the establishment of the company's objectives, as well as the methods for accomplishing those objectives and keeping track of performance [14].

Internal control is an integral aspect of management; hence it should theoretically contribute to better corporate governance (i.e., plan, organize, direct, and control). "An organization's internal controls help it stay on track to meet its goals and fulfill its mission with as few hiccups as possible" [15]. A strong internal control system enhances a business's efficiency, prevents asset theft, and meets legal requirements. It ensures accurate financial statements, ensuring transactions are recorded, valued, and classified. A weak system leads to poor corporate governance, resulting in less efficient and effective goals fulfillment. "There are a variety of metrics through which this partnership is evaluated inside a company. Characteristics of the board of directors, including the board's independence, diligence, experience, and size, are the focus of this research on corporate governance. The board of directors is accountable for an organization's performance, with the goal of maximizing shareholder value, and is widely recognized as an integral part of internal control mechanisms for keeping an eye on management" [16]. Quality financial reporting, in turn affecting investor confidence, is influenced by boards of directors who follow good corporate governance procedures" [17].

The objective of the study is to assess the effectiveness of internal control and corporate governance in the Ghanaian banking industry. The study specifically seeks to:

1. Determine the effectiveness and relevance of internal controls and corporate governance in the Ghanaian banking industry.
2. Assess the role of internal auditors and staff in ensuring effective internal control in the Ghanaian banking industry.
3. Evaluate the mechanism of corporate governance implementation vis-à-vis the two categories thus - governance structure, and governance mechanism.
4. Examine the relationship between internal

controls and corporate governance.

Research Questions

1. What is the effectiveness and relevance of internal controls and corporate governance in the Ghanaian banking industry?
2. What is the role of internal auditors and staff in ensuring effective internal control in the Ghanaian banking industry?
3. What is the mechanism of corporate governance implementation vis-à-vis the two categories thus - governance structure, and governance mechanism?
4. What is the relationship between internal controls and corporate governance in the Ghanaian banking industry?

Hypotheses

The Committee of Sponsoring Organizations of the Treadway Commission (COSO) is a group working to prevent corporate fraud and promote organizational governance, corporate ethics, internal control, business risk management, fraud, and financial reporting. The COSO internal control framework consists of five interconnected components: the control environment, risk assessment, control activities, information and communication, and monitoring. The effectiveness of internal controls is crucial for a company's success and long-term survival [18].

Effective internal control is essential for corporate governance, as it ensures businesses operate effectively, comply with mission statements, and provide accurate management data and financial reporting. It encourages conformity with current rules and regulations, enabling firms to respond to hazards, achieve performance and profitability goals, protect resources from loss, report control deficiencies, and commit to relevant laws and regulations. The study therefore hypothesizes that:

1. **H1:** Good control environment, risk assessment, control activities, information and communications and monitoring lead to effective internal control.
2. **H2:** fairness, transparency, accountability, and responsibility lead to effective corporate governance in organizations
3. **H3:** Effective role of internal auditors lead to effective internal control of the organization.
4. **H4:** there is a significant and positive relationship between internal controls and corporate governance of an organization.

Methodology

The study was basically a case study based and was approached quantitatively. Non-probability sampling was used for this study's sample strategy. The study made use of questionnaires to gather the data. In analyzing the data, the study made use of descriptive statistics, Kendall's coefficient of concordance (w), correlations and regression analysis techniques.

Five banks (Absa Bank Ghana, Ecobank, Standard chartered Bank, Agricultural Development Bank, and Ghana Commercial Bank) were sampled for the study. Four hundred (400) respondents from the above sampled banks helped offer meaningful and enough information to answer the study questions.

Data Collection

Questionnaires were distributed. There were five main sections to this survey (Part I, II III, IV and V). The first section will be geared on eliciting information about the respondents' demographics. The second section includes evaluation questions focused on internal controls and corporate governance. The third section focused on the function of internal auditors and other staff members in achieving the goal of efficient internal control. In Part IV, will look at how the two broad headings of "governance structure" and "governance mechanism" intersect.

In sum, the following tools were utilized for the data collection:

1. Administration of questionnaires,
2. Face to face interview,

3. Observation,
4. Review of secondary sources of data (journals, articles, publications, etc).

Data Analysis Procedure

The recorded data from the structured questionnaire served as the basis for the quantitative data, which was presented in accordance with the various parts and subsections of the questionnaires. The quantitative information will first be shown in the form of tables or charts. That's the idea behind data visualization: to make complex information easy to digest. Each data set was summarized with numerical scores and percentages arranged in categories to give context for the information presented. Second, the researcher will be able to provide an analytical description and interpretation of data by using descriptive statistical processes thanks to the data's visual presentation (tables, charts, and graphics) in numbers and percentages. A Non-probability sampling technique was used in selection elements for the study from general staff under the relevant areas of study. This technique was considered relevant because the study required statistical inference about the population. It also afforded the researcher the opportunity to select elements that accurately represented the total population from which the elements were drawn. Due to the sheer size of the population, a significant part of it was considered for the study across all selected banks.

Data gathered were examined and presented in the form of tables and graphs. This would facilitate easy analysis of the data. For example, the use of tables would help in the summarization and condensation of data, analysis of ranges, variances, trends, and relationships. Appropriate statistical data analysis tools such as descriptive, inferential and test statistics would be reviewed before analyzing the data. Raw data collected would be edited for completeness, consistency and to ensure it is systematically organized. In analysis, the deductive explanations will be made of quantitative data to give meaning to them as well as explain their implications and descriptive statistics like the mean score and standard deviation. The outcome of the statistical analysis of the data would be represented through graphs, bar charts and pie charts for easy appreciation by stakeholders. Based on the outcome of the data analysis, appropriate recommendations would be made on the findings of the research.

Results

This part of the study focuses on the tabular representation of the findings obtained from the investigation. Considering the characteristics of the results, more consideration has been given to the ramifications of the findings. Statistical Package for the Social Science (SPSS) and IBM Amos version 23 were utilized to do the analysis on the results.

Objective 1: Effectiveness of Internal Controls and Corporate Governance in the Ghanaian Banking

The study determined the effectiveness and relevance of internal controls and corporate governance in the Ghanaian banking industry. The results on the effectiveness and relevance of internal controls and corporate governance in the Ghanaian banking industry are demonstrated in this section of the chapter.

Hypothesis 1

The study hypothesized that the internal controls and corporate governance in the Ghanaian banking industry are effective. Taking this into consideration, the test value for the analysis was 5. Therefore, this was the population mean since the study imagined that the internal controls and corporate governance in the Ghanaian banking industry are effective, and the 5 represent the extreme positive responses given by the respondents. The analysis was done as two-tailed test with alpha (α) = 0.05.

Table 1 shows the one-sample statistics for the effectiveness internal controls and corporate governance in the Ghanaian banking industry.

The calculated mean of the effectiveness internal controls was 3.3604 which is closer to the extreme positive score 5 with a SD= .57337 and a standard Error = .03069 and calculated mean of the effectiveness corporate governance was 3.6218 which is closer to the extreme positive score 5 with a SD= .57337 and a standard Erro = .03069.

Table 1. One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Internal Control	349	3.3604	.57337	.03069
Corporate Governance	349	3.6218	1.03683	.05550

Source: Researcher's field survey 2023

H_0: The internal controls and corporate governance in the Ghanaian banking industry are not effective.

H_1: The internal controls and corporate governance in the Ghanaian banking industry are effective.

The Table 2 presents the results of the one sample t-testing in verifying the hypotheses stated on the effectiveness and relevance of internal controls and corporate governance in the Ghanaian banking industry. T-statistics and critical values were estimated. The study tests the null hypothesis (H_0): the internal controls and corporate governance in the Ghanaian banking industry are not effective. The study will reject the null hypothesis (H_0) if the T-statistics is greater than the critical value and will fail to reject the null hypothesis (H_0) if the T-statistics is less than the critical value. The null hypothesis is rejected when: t obtained is equal to or more extreme than t 1.9852. Where t 1.9852 is the critical value from the t-distribution and is found using the T Distribution Critical Value Table.

As shown in the Table 2, the T-statistics, for the variable is greater than the critical value, the study therefore reject the null hypothesis and concluded that the internal controls and corporate governance in the Ghanaian banking industry are effective. In view of this, based on the variable considered under the study, the internal controls and corporate governance in the Ghanaian banking industry are effective.

Objective 2: In this section the study examined the role of internal auditors and staff in ensuring effective internal control in the Ghanaian banking industry. The findings on the role of internal auditors and staff in ensuring effective internal control in the Ghanaian banking industry are shown in this section.

Hypothesis 2: *Effective role of internal auditors leads to effective internal control of the organization.*

Table 2. One-Sample Test

	Test Value = 5					
					95% Confidence Interval of the Difference	
	t	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Lower**	**Upper**
Internal Control	53.422	348	.000	1.63964	-1.7000	-1.5793
Corporate Governance	24.833	348	.000	1.37822	-1.4874	-1.2691

Source: Researcher's field survey 2023

Table 3 displays the results of the calculated Kendall's Coefficient of Concordance (W), which shows a value of 0.846, which is significant at the 5% level. The study found that 84.6% of respondents agreed that it was important to look at how internal auditors and personnel can work together to improve internal control in Ghana's financial sector. As a result,

we cannot accept the null hypothesis that respondents do not share a common ranking of the roles. Because the P Value is less than 0.05 (0.000), it is evident that respondents agree on how important internal auditors and employees are in maintaining strong internal control in Ghana's financial sector. According to the results shown in Table 3, the mean scores with the highest scores indicating the role of internal auditors and staff in ensuring effective internal control in the Ghanaian banking industry. Survey respondents recognized and selected "Review of systems established to ensure compliance with policies, procedures, plans, laws and regulations impacting operations and reports" as the #1 most commonly the role of internal auditors and staff in ensuring effective internal control in the Ghanaian banking industry, according to the results of the survey. As the second most the role of internal auditors and staff in ensuring effective internal control in the Ghanaian banking industry, "Review of operations and programs" came in second place. "Duty of detecting and preventing Illegal practices; Duty of reporting illegal acts; Duty of providing information to management; Duty to act competently; Duty to make a report to the company about the problems and Duty to follow the corporate policy" ranked 3rd, 4th, 5th, 6th … roles of internal auditors and staff in ensuring effective internal control in the Ghanaian banking industry correspondingly. In view of this, the results of the study confirm that internal auditors and staff have the role to review of systems established to ensure compliance with policies, procedures, plans, laws and regulations impacting operations and reports; to detect and prevent of illegal practices; to report illegal acts; provide information to management; act with competence; make a report to the company about the problems and follow the corporate policy in ensuring effective internal control in the Ghanaian banking industry

Objective 3: The study further evaluated the mechanism of corporate governance implementation vis-à-vis the two categories of governance structure and mechanism. The findings on the mechanism of corporate governance implementation vis-à-vis the two categories—governance structure and governance mechanism—are shown in this section.

Hypothesis 3: the mechanism of corporate governance implementation vis-à-vis the two categories thus - governance structure, and governance mechanism.

Table 3. Role of Internal Auditors and Staff in Ensuring Effective Internal Control

	Mean Rank	Ranking
Duty to provide information to management.	5.83	5th
Duty to make a report to the company about the problems.	4.40	7th
Duty to follow the corporate policy	4.10	9th
The internal audit reports are discussed by the Audit Committee	4.11	8th
Detection and prevention of illegal practices.	6.52	3rd
Review of systems established to ensure compliance with policies, procedures, plans, laws & regulations impacting operations & reports	7.84	1st
Duty to report illegal acts.	6.02	4th
Duty to act with competence	5.41	6th
Review of operations & programs	6.85	2nd
Test Statistics		
N	349	
Kendall's W[a]	.846	
Chi-Square	771.341	
df	9	
Asymp. Sig.	.000	

Kendall's Coefficient of Concordance Source: Research Data (2022)

Table 4 displays the results of the calculated Kendall's Coefficient of Concordance (W), which shows a value of 0.667, which is significant at the 5% level. The study found that 66.7% of respondents agreed that it was important to look at the mechanism of corporate governance implementation vis-à-vis the two categories of governance structure and governance mechanism. As a result, we cannot accept the null hypothesis that respondents do not share a common ranking of the mechanisms. Because the P Value is less than 0.05 (0.000), it is evident that respondents agree on the mechanism of corporate governance implementation vis-à-vis the two categories thus - governance structure, and governance mechanism. According to the results shown in Table 4, the mean scores with the highest scores indicate the mechanism of corporate governance implementation vis-à-vis the two categories of governance structure and governance mechanism.

Objective 4: The study finally examined the relationship between internal controls and corporate governance in the Ghanaian banking industry. The research utilized a hierarchical multiple linear regression analysis, where the control variables were age, gender, current position, and education qualification level. We decided to include these control variables since most scholars have hypothesized that these factors may potentially have an influence on the model including corporate governance and internal controls (Steinke et al., 2015; Sahi et al., 2013; Lee & Steers, 2017; Kulkarni, 2010; Abdulkarim, 2013; Wahyuni, 2013; Schneider & Barbera, 2014; Rutishauser & Sender, 2019).

Hypothesis 4: There is a significant and positive relationship between internal controls and corporate governance of an organization.

Multiple linear regression analysis with a hierarchical structure in two stages was used. Socio-demographic factors such as gender, age, education level, and current position were collected as a first step. The second stage, or model, factored in organizational environment and job satisfaction as independent variables. Internal Controls was shown to be a significant predictor of corporate governance (β =.526, p .05), as shown in Table 5. This lends credence to H4, which hypothesized that "*there is significant and positive relationship between internal controls and corporate governance of an organization"*. Internal controls are the rules, processes, and technology protections that any business has in place to protect its assets from being harmed as a result of inappropriate behaviour or errors. One might think of them as the more hands-on component of corporate governance; they are the mechanisms by which the company guarantees that it abides by its own internal moral code.

There was a 26.3% explanatory variance for the influence of the independent factors on corporate governance (F = 22.126, p<.01). However, in the first model (β= -.011, p<.001) and the second model (β = -.084, p<.01), age is the only demographic factor that negatively predicts corporate governance.

Table 4. Mechanisms of Corporate Governance Implementation

Mechanisms of Corporate Governance	**Mean Rank**	**Ranking**
The firm has a proper mix of directors with the appropriate skills, knowledge, and experience to enable them to effectively participate in board deliberations.	7.53	9th
The board has a process of selection that ensures an optimum mix of directors and officers who can perform competently and professionally and add value to the company	7.9	6th
The powers, roles, responsibilities and accountabilities between the board and management are clearly defined, segregated, and understood.	8.49	1st
The board of the company has the necessary committees to assist in the performance of its duties and responsibilities	7.91	4th
The board formulates and reviews, as well as updates, the company's corporate vision and mission, values and purpose, strategic objectives, policies, and procedures that serves as a guide to the company's activities	7.02	11th
The board size is lesser than or equal 12	5.72	13th
The expected remuneration of top managers is tied to the value of firm shares	8.28	3rd
The board of the firm schedules and holds regular meetings and special meetings when required by business exigencies	7.6	8th
The company has a remuneration committee and is it chaired by an independent director	7.53	9th
The Chief Executive/MD is accountable to the governing body for the ultimate performance of the firm and implementation of the governing body's policies	7.9	6th
The governing body established an audit and finance committee, comprising non-executive members, with responsibility for the independent review of the framework of control and the external audit process	8.49	1st
The board oversees the implementation of the company's human resource and personnel development programs and provides for a succession plan for senior management	7.91	4th
The company is actively involved in projects within the local community	7.02	11th
Proxy voting is allowed on the governing board of the firm	5.72	13th
Test Statistics		
N	349	
Kendall's Wa	0.667	
Chi-Square	305.059	
df	13	
Asymp. Sig.	0	

Table 5. Hierarchical Multiple Linear Regression Analysis with Internal Controls as Predictor of Corporate Governance

	Model 1				**Model 2**			
	B	***SE B***	**β**	**t**	***B***	***SE B***	**β**	**t**
(Constant)	3.268**	0.305		10.723	1.075**	0.327		3.29
Gender	0.074	0.094	0.042	0.787	0.052	0.081	0.03	0.648
Age	-0.015	0.072	-0.011	-0.204	-0.112	0.062	-0.084	-1.79
Current Position	0.007	0.073	0.005	0.094	0.029	0.063	0.023	0.466
Years in Position	0.005	0.053	0.005	0.093	-0.016	0.046	-0.017	-0.357
Academic Qualification	0.202	0.092	0.12	2.189	0.065	0.08	0.039	0.817
Internal Controls					.801**	0.072	.526**	11.174
R^2		.017***				0.28		
F		1.161***				22.126**		
ΔR^2						.263†		

Note: * p<.05, **p<.01, and ***p<.001 and † = tendency

Summary of Key Findings

The current study investigated the effectiveness of internal control and corporate governance in the Ghanaian banking industry. Based on an extensive literature review, four hypotheses were formulated and tested. The first hypothesis predicted that "*a good control environment, risk assessment, control activities, information and communications, and monitoring lead to effective internal control.*" The second hypothesis argues that *"fairness, transparency, accountability, and responsibility lead to effective corporate governance in organizations." Thirdly, it was posited that "effective internal auditors lead to effective internal control of the organization."* And finally, the study argued that *"there is a significantly positive relationship between internal control and the corporate governance of an organization."* The study targeted staff from Absa Bank Ghana, Ecobank, Standard Chartered Bank, the Agricultural Development Bank, and the Ghana Commercial Bank in Accra. However, due to time constraints and the limitations of other resources, 349 samples were selected using simple random sampling and purposive sampling techniques. Based on the nature of the study, cross-sectional design was employed in which a well-structured and close-ended questionnaire was the main measurement instrument for data collection. Descriptive analysis, hierarchical multiple linear regression analysis and path analysis were performed to test the various hypotheses. The study found that the internal controls and corporate governance in the Ghanaian banking industry are effective. The results of the study confirm that internal auditors and staff have the role to review of systems established to ensure compliance with policies, procedures, plans, laws and regulations impacting operations and reports; to detect and prevent illegal practices; to report illegal acts; provide information to management; act with competence; make a report to the company about the problems and follow the corporate policy in ensuring effective internal control in the Ghanaian banking industry. The study also discovered that internal controls predicted corporate governance positively.

Discussion of Findings

The study determined the effectiveness and relevance of internal controls and corporate governance in the Ghanaian banking industry. The results of the study show that the T-statistics, for the variable was greater than the critical value, the study therefore rejected the

null hypothesis and concluded that the internal controls and corporate governance in the Ghanaian banking industry are effective. In view of this, based on the variables considered under the study, the internal controls and corporate governance in the Ghanaian banking industry are effective.

The study found that internal controls and corporate governance in the Ghanaian banking industry are effective, as the T-statistics were greater than the critical value. The COSO internal control framework consists of five interconnected components: the control environment, risk assessment, control activities, information and communication, and monitoring. These aspects provide a solid basis for describing and analyzing an organization's current internal control structure.

Effective internal control refers to a company's capacity to give reasonable confidence over the attainment of effectiveness and efficiency in operations, dependability in financial reporting, and compliance with rules. It ensures that businesses operate effectively and in accordance with their mission statements, and that management data and financial reporting are accurate. It encourages conformity with the rules and regulations that are now in effect.

To achieve their goals, organizations need to establish practical targets, allocate appropriate resources, and deal with various transaction cycles and strategic area operations. They also need to conduct risk assessments, disseminate data on risks and changes, and keep tabs on internal control functions to ensure they are doing their jobs and achieving their goals.

The study also examined the role of internal auditors and staff in ensuring effective internal control in the Ghanaian banking industry. Internal auditors have the primary goal of strengthening internal control, which involves reviewing systems established to ensure compliance with policies, procedures, plans, laws, and regulations. They also perform post-merger integration reviews and serve as intermediaries between agent managers and director principles. However, their function can be confused when they are treated as equals, as their involvement in system changes can lead to auditors monitoring their own work as the system is implemented.

The study evaluated the mechanisms of corporate governance implementation in relation to governance structure and mechanism. It found that clearly defined powers, roles, responsibilities, and accountabilities between the board and management, establishment of an audit and finance committee, and the expected remuneration of top managers were the mechanisms of corporate governance implementation. The Chief Executive/MD was accountable to the governing body for the firm's performance and implementation of the governing body's policies. The board of the firm scheduled and held regular meetings, and the firm had a proper mix of directors with the appropriate skills, knowledge, and experience to effectively participate in board deliberations.

The study also examined the relationship between internal controls and corporate governance in the Ghanaian banking industry. Internal controls are the rules, processes, and technology protections that businesses have in place to protect their assets from harm due to inappropriate behavior or errors. The study found that the audit committee's financial knowledge correlates significantly with the company's return on assets.

In Indonesia, [19] found a correlation between internal management, reflective leadership, and official accountability. In another study, [20] investigated the workings of each of the five parts of an efficient internal control system and how they relate to financial performance. The study found that the efficacy of internal controls was highest in private banks, lowest in state banks, and highest in Islamic banks, with a moderate gap between the three.

Implication of the Study

The study has got some contributions and implication to make like any other study. This

has been convened under contribution to practice and contribution to theory.

Contribution to Theory

The study has contributed to theory, the use of the agency theory in this study has shown that firms with good internal controls are likely to have effective corporate governance. This is refreshing, as they act as a control mechanism through the performance of an independent monitoring function. Additionally, the disclosure of information related to internal control is considered a monitoring function and an antidote to reducing, if not completely eliminating, the persistent conflicts between shareholders and management. The study is also believed to be leading the pathway to improving the insight of the variables that have the potential of affecting internal control information disclosure in listed companies, more especially regulated financial institutions. On the basis of the findings, the researcher posits that firms in Ghana should focus on improving their corporate governance and internal control systems as a way of managing their risk factors for healthy and sustainable development. The outcome of the study provides empirical evidence on the extent of internal disclosure practices in Ghana, which are integral to the preparation of financial reports for all key stakeholders and potential investors. This study thus affirms the effectiveness of internal control and corporate governance practices in the Ghanaian banking industry, and by extension, this bolster and serves as an incentive for the international investment community to invest in Ghana.

Contribution to Practice

The findings of this study have implications for senior management and internal auditors in the Ghanaian banking industry. They provide an insight into the relationship between corporate governance and internal control. These insights suggest that the top management should adhere to the proper implementation of internal control systems in order to develop sound corporate governance to help increase economic attraction by Ghanaians and help ensure the rights and benefits of the business sector. Additionally, the findings encourage researchers to address other aspects concerning the relationship between internal control and corporate governance in Ghana as an example of a developing country.

Internal auditing plays an important role both in ensuring adequate internal control and good corporate governance. Beside the norms specific to these processes and activities, the information referring to the way of organizing the position, role, and responsibilities that this activity or function should have in the frame of an entity is comprised in the codes of corporate governance. Moreover, through the independent analysis and evaluation of the governing processes, risk management, and internal control, the internal audit could ensure the management of the conditions necessary for accomplishing the targeted objectives. Actually, internal audit contributes to the development and consolidation of these systems through the formulated opinions of internal auditors regarding the adequacy, functionality, or inadequacy of the audited systems, controls, and processes, as well as through the recommendations reported regarding their nature.

Recommendations

The study provided the following suggestions, which need to be carefully considered:

1. Internal controls can only be truly successful if they are both well-documented and widely disseminated information, and if compliance officers are assigned the responsibility of monitoring compliance concerns. They should have the knowledge and abilities required, and those should match the complexity of the institution's operations. The board and senior management of banks should foster an internal culture that stresses and illustrates

the significance of internal controls at all levels of people. Everyone who works at a bank must be familiar with internal controls and actively participate in them.

2. For the purpose of improving the unity, operability, and comparability of disclosure, Ghanaian regulatory organizations ought to adopt norms and regulations on the substance and structure of internal control disclosure. In addition, Ghanaian firms that are publicly traded need to strengthen both their corporate governance and their internal control systems to maintain their companies' health and foster their growth.
3. Regardless of the organizational structure, top management is ultimately accountable for the planning, rollout, operation, and maintenance of an effective system of internal control and risk management that guarantees the fulfilment of the goals and execution of the steps required to put into practice the principles of good corporate governance. If the internal audit's intended purpose is met, and if its intended objectives are met, and if its implicated responsibilities are fulfilled, then the audit will provide an added layer of assurance that the internal controls are working as intended, are improving, and are controlling risks effectively.

Conclusion

Better governance and reduced corruption are the results of efficient and well executed internal control. State-owned enterprises in West Java, Indonesia, came to a similar result, finding that strong internal control was positively connected with excellent corporate governance. In a business setting, this collaboration may be measured across a range of criteria. The characteristics of the board of directors are the topic of this study of corporate governance. These characteristics include the board's independence, diligence, experience, and size. Boards of directors are responsible for an organization's performance with the aim of maximizing shareholder value, and they are generally seen as an essential aspect of an organization's internal control systems for monitoring management.

If there is a wall separating ownership and management, corporate governance processes will influence management's choices. This is carried out to raise the bar for transparency and productivity in the financial reporting process. Because shareholders are kept apart from business executives, there is a communication breakdown.

That's why it's important to have both internal controls set up by the board of directors and external checks and balances provided by a firm's auditors. The knowledge gap is exacerbated by the fact that business ownership and management are kept separate. In recent years, there has been a heightened awareness of the need of good corporate governance, leading to a rise in the level of scrutiny devoted to board oversight.

Building robust internal control systems and practicing good corporate governance are two of the most important factors in improving the productivity of a firm. As a direct consequence of this, a number of studies have been undertaken to investigate the effect that internal control systems have on the production of businesses.

Nevertheless, the dimensions or criteria that were selected for the Internal Control Systems imposed limitations on the scope of some of this research. The study assessed the effectiveness of internal control and corporate governance in the Ghanaian banking industry. Dependent on the findings of the study, it is concluded that the internal controls and corporate governance in the Ghanaian banking industry are effective, and the internal controls predicted corporate governance positively.

Conflict of Interest

Prince Boadi, the researcher, declares that there is no conflict of interest related to this research work.

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Electoral Legitimacy and Gender Representation Barriers; Theories and Practices in Nigeria

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Abstract

The article describes relevant concepts and theories on Gender Representation and Electoral Legitimacy behaviours and barriers that obstruct global policies for gender equity model to a free and fair election. The limiting barriers and theories described, include Class-Conflict versus Representation Theory, Gender vs Culture, Electoral Legitimacy Deficit vs Dominance Theory, Machismo Culture, Institutional concept, Human Capital, Feminist Rights Concepts (FGF) and the UN Think, Assess, Consider, and Take Action (UNTACT) Concept. The article adopts a descriptive secondary qualitative method to gather data on the key theories, barriers and practices affecting gender representation electoral. Data collection include previous studies, articles, reports, publications, and Electoral Commission official documents already generated. These various sources of information gathered, was critically examined, reviewed, analysed, and synthesized to understand the context in which gender representation barriers exist. Research results indicted Nigeria Electoral process as extremely unreliable at the output-delivery process, and thus, criticised for having flaws and failing to completely enforce candidate electoral rules, which impacts female representation. However, the research contributed to a deeper understanding of the complexities surrounding electoral theories, practices and their impact on electoral system's legitimacy. Findings suggest, importance of challenging patriarchal electioneering structures, cultural norms, and power imbalances in the political sphere and the need for power dynamics to be examined critically, to deliver effective gender or female representation.

Keywords: *Electoral Legitimacy, Gender Representation, Theories, Barriers, Nigeria.*

Introduction

United Nations (UN) election team in 2019, reported that female representation in Nigeria politics is far below global and regional standards the number of women in the legislature only saw a slight increase between 1999 and 2007 from 2.3% to the current 7.8 % [1]. Also, in the March 2023 General Election Results, the Independent National Electoral Commission, (INEC) estimated that 96% of female "candidates crashed out and lost to their male counterparts" [2] with a total number of 15,533 candidates on the ballot papers for Presidential, Governorship, National and State assemblies' elections across the 18 registered political parties. Female candidates accounted for only 10.1% with a total number of 1,553, the males constituted 13,754, showing 89.8 %. A total of 72 women eventually got elected while 1,48 could not win their ticket thus lost to male counterparts. Comparatively, INEC Conference Press Report, in 2019 shows that about 2,970 female candidates were candidates in 2019, but only 62 won which means 97% failed to get elected. In total, there were only 4 female deputy governors elected, and 40 women also elected to different 36 states assemblies while 18 women made it to the National Assembly [3].

The principles of ruling and being ruled according to Awe (2023) in an interview on international Women 's Day assessment, are

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derived from the features of democracy namely "elections, as all citizens are eligible for all offices", albeit Nigeria data gave a different insight to this philosophy. She recalled that despite excelling in the private sector, Nigeria ranked 184 out of 192 countries in women's representation at the national parliaments [4]. In the World Comparative Study Report, the global data for women in parliaments from Inter-parliamentary Union (IPU 2021) research on Nigeria Women in election cited as few as 157 women elected candidates to the 469-member National Assembly, since 1999 to date [5].

Hitherto, Awe (2017) opined in the conference for Women Leadership that women's representations in political ambitions were never rated as relevant to the nation's development as such, are disadvantaged in the political, economic, and social leaderships from the era of the first election in Nigeria in 1923 to date [6]. Only a handful of women from privileged backgrounds are nonetheless able to participate in the election, to be voted for, while the majority are being exploited mainly to vote instead of being allowed and supported to stand in for elections. Still, even such token efforts had no constitutional backing and were thus subject to change.

Unfortunately, in abysmal failure the introduction of Electoral Act framework in Nigeria from 2006, to the most recent 2022 Electoral Act Reform have indirectly and surprisingly, increased political parties 'opposition to transparent process of representation [7]. Multiple empirical survey on Gender Policy Review by International Foundation for Electoral Systems, (IFES) Nigeria (2023), [8] have demonstrated that electoral laws are inconsistent with women's representation because women candidates are not well-supported by the same laws as there is no enforcement of those regulations in practice. IFES described such behaviour as a violation of citizens' fundamental rights to exercise political power, as enshrined in Nigeria 1999 constitution. The recent election is also example of a preventive democracy for women" because "it is no fallacy the 2023 general election ended in adjudged bitter struggles and protests from the public due to the large-scale rigging and intimidation.

The National Institute for Legislative and Democratic Studies (NILDS,2023) Conference Report enumerated that a significant portion of the Nigerian population observed the 2023 elections in relation to the August 2022 elections in Kenya [9]. In both cases, The U.S department of State Summit (2023) also recalled that "a winner was announced, but the primary opponents filed a legal challenge, claiming the vote counting and the verification webpage had been compromised through hacking" [10]. This is where electoral legitimacy is seen to become tweeted at the delivery and output level. In Nigeria the president elect in person of Ahmed Bola Tinubu was sworn into office without the court injunctions on the election result. Even though, the two opposition parties People democratic party (PDP), and the other, Peter Obi of the Labour Party (LP) continue to contest in court, the result of the election and awaiting judgement. But when it was held on September 6th, 2023, both candidates' petitions were dismissed in favour of the ruling All Progressives Congress (APC) Party on the ground of lack sufficient evidence.

This article's position is based Christensen and Setala (2020) idea that, "if a government is seen as legitimate, then the process that produced it is also considered legitimate". Conversely, "if a government is seen as illegitimate, (as presented by the public in the 2023 elections) then, the process that produced it is also seen as illegitimate" [11].

Therefore, the objective of this study is to provide a thorough examination of factors contributing to gender representation barriers including theories and practices, the cultural norms that hinder women's participation in electoral processes. By conducting an in-depth analysis, we seek to uncover insights that can inform policy recommendations and

interventions aimed at enhancing electoral legitimacy through improved gender representation in Nigeria's political sphere.

The study aims to investigate the barriers and practices that impede gender representation in Nigerian elections and understand their implications for electoral legitimacy. By examining the challenges female candidates face and the factors contributing to their underrepresentation, this research seeks to shed light on the existing gender gaps in Nigerian politics and propose potential solutions for enhancing gender equality in the electoral process. However, the problem to be addressed in this study is the significant disparity in gender representation in the 2023 Nigerian elections explained above. Despite the introduction of electoral acts and policies promoting gender equality, female candidates face substantial barriers that hinder their success at the polls. This underrepresentation of women in political office raises concerns about the inclusivity and democratic legitimacy of the Nigerian government.

Candidates vying for significant political positions, such as governorship, presidency, legislative seats, or parliamentary positions, often encounter various challenges and strategies related to the allocation of party positions. These challenges arise from several factors: (a) The incumbent party desires to maintain power for two consecutive terms. (b) The inclination to favour senior members of the party when allocating positions. (c) The influence of male candidates' popularity and the amount of money they contribute to the party's campaign. (d) The party's criteria for selecting acceptable candidates and the negotiation methods employed to choose desired candidates may extend beyond considerations of gender and public interests. The current state of affairs in Nigeria is perceived as an abuse of power by politicians, particularly party chairpersons and committee members. These individuals prioritise their party's interests by favouring affluent male candidates over female candidates who aspire to compete for the same positions. In IFES, (2010) arguments, these practices, fail to accurately depict the practical aspects of electoral legitimacy, leading one to believe that statistical data suggests women face challenges in attaining gender equity within the strict and demanding processes of party nominations, despite electoral regulations ensuring equal opportunities to compete for the same positions [12].

Several measures have been implemented in Nigeria to address the gender representation gap in politics. These include the introduction of electoral acts and policies, such as the 2006, 2010, 2015, 2019, and 2022 electoral reforms, which aim to promote non-biased gender representation in political offices. Additionally, efforts have been made to increase awareness about women's political participation and encourage women to run for office through various capacity-building programmes and advocacy campaigns by the civil societies in collaboration with Women Affairs government agency.

Nonetheless, determining the best solution for addressing the gender representation barriers in Nigerian elections requires a comprehensive analysis of the effectiveness and impact of the existing measures. This study critically evaluates the outcomes of the implemented electoral acts and policies and the success of conceptual frameworks in capacity-building programmes and advocacy campaigns. Through this evaluation, it is anticipated that the study will contribute to identifying the most effective strategies for enhancing gender representation in Nigerian politics.

Furthermore, it is important to acknowledge certain limitations that may affect the study. Firstly, the research will rely on available data and information, which may have inherent limitations or biases. Additionally, conducting research in politics and elections can be complex due to various factors, such as the influence of power dynamics, social norms, and cultural contexts. These complexities may present

challenges in obtaining comprehensive and unbiased data. Additionally, time and resource constraints may limit the study's scope, impacting the analysis's breadth and depth.

This research aims to contribute to the existing knowledge on gender representation and electoral legitimacy in Nigeria. By identifying the barriers and practises that hinder female candidates' success in elections, the study can inform policymakers, electoral bodies, and civil society organisations on potential strategies for promoting gender equality in Nigerian politics. The findings and recommendations of this research may serve as a basis for developing targeted interventions and policy reforms to enhance gender representation and strengthen the democratic legitimacy of the Nigerian government.

Methods

For this research, the researcher has chosen a secondary qualitative method to gather data and analyse the theories, barriers and practices affecting gender representation in Nigerian elections. The secondary qualitative method involves the collection and analysis of data that previous studies, reports, publications, literature and official documents have already generated. The researcher has reviewed and analyse various sources of information, including academic articles, reports from electoral bodies, governmental publications, and relevant literature, to understand the barriers and practices related to gender representation in Nigerian elections. The researcher critically examined and synthesized the information from these sources to draw meaningful conclusions and develop a comprehensive understanding of the research topic. Moreover, secondary data is cost-effective and time-efficient compared to primary data collection methods, as it avoids the need to conduct new surveys or interviews. Additionally, the secondary qualitative method is appropriate for exploring complex social phenomena and understanding the context in which gender representation barriers exist. By analysing existing qualitative data, the researcher can gain insights into the multifaceted nature of gender dynamics, cultural norms, and political practices that contribute to the underrepresentation of women in Nigerian politics.

Other methods, such as primary data collection through surveys or interviews, could have been considered for this research. However, primary data collection required substantial resources, including time, funding, and participant access. Given the scope and scale of the research, it may have been challenging to gather a representative sample of participants and conduct extensive interviews or surveys. Moreover, the secondary qualitative method ensured a comprehensive topic analysis and avoided potential biases associated with primary data collection. This research collected the data through secondary literature sources, including academic articles, government reports, and relevant documents. The researcher thoroughly reviewed academic databases, government websites, Wikipedia and other reputable sources to identify secondary sources that discussed theoretical frameworks on electoral legitimacy and gender representation. Key search terms related to the research aim, such as "electoral legitimacy," "gender representation barriers," and "theoretical frameworks," were used to retrieve relevant literature. The researcher reviewed theoretical frameworks on electoral legitimacy, drawing from various disciplines such as Legitimacy theory, Class conflict theory, Election theory, Gender theory, and Representation theory. These theoretical frameworks provided a foundation for understanding the complex dynamics of gender representation barriers in Nigerian elections.

The theoretical frameworks provided insights into the factors contributing to gender representation barriers and the implications for electoral legitimacy. The data collected from the secondary literature were used to address research questions related to the barriers and practices hindering gender representation in

Nigerian elections. The data collected through secondary literature and government reports were also used to support the development of recommendations and potential solutions for enhancing gender representation in Nigerian elections. By drawing on the insights and empirical evidence provided by the theoretical frameworks, the research aimed to propose strategies and interventions that address the identified barriers and promote gender equality in the electoral process.

Lastly, content analysis was used to analyse the collected data from secondary literature and government reports. Content analysis is a systematic approach to analysing qualitative data by examining the content, themes, and patterns present in the text. It allowed the researcher to systematically organise and categorise the information extracted from the literature and reports. This approach facilitated a structured analysis and ensured a comprehensive examination of the data. Content analysis also enabled the identification of common arguments, theoretical perspectives, and empirical evidence across different theoretical frameworks. By categorising the data according to relevant concepts, the researcher gained a deeper understanding of the factors contributing to gender representation barriers and their impact on electoral legitimacy. This method helped identify the similarities and differences between the various theoretical frameworks, highlighting critical areas of agreement and divergence.

Additionally, content analysis provided a rigorous and transparent data analysis approach. The categorisation ensured the analysis was grounded in the data, reducing the potential for bias or subjective interpretations. Furthermore, the content analysis helped synthesise the findings and present a coherent narrative addressing the research aim. By organising the data into meaningful categories, the researcher could comprehensively analyse the gender representation barriers in Nigerian elections, backed by empirical evidence and theoretical frameworks.



Figure 1. Concepts & Theories Limitations

Theoretical Frameworks

Class–Conflict Vs Representation Concepts

Maddock recalled Karl Marx Wikipedia explanation of the "type of society we live in concerning class struggles and class stratifications between different social classes, particularly the struggle between the proletariat and the bourgeoisie; the workers and the owners; or between classes conflicts and stratification based on poverty, culture, religion, ethnicity, oppression, exploitation, deprivation, marginalization, sexuality, gender and nationality" [13]. In light of this theory, one can argue that the conflict of interests between political actors in Nigeria's electoral process is in contrast, to the ruling government's abilities to manage the existing political class conflicts that determine the nature of representation. But on the other side, representation concept in the Wikipedia of Political Science (1968) is described by Huntington (1968) as a political climate essential for a healthy democracy. He argued that situations of biases, by which some groups of gender are perceived in politics, have had an indirect impact on misrepresentation and have created an environment in which "ethnicity, sexism and gender-based discrimination are not challenged irrespective of its direction" [14]. This has led to a culture in which existing multi-party grouping and women's voices are not heard or respected. Therefore, the theory consists of pseudo-power-struggles during electoral contests between various political candidates and their Godfathers to wedge power to their candidates in lieu to control.

Despite its relevance, class conflict and representation theories can be rated engendering economic class as the most critical of all relationships in society. It can be interpreted that Marx focused on economic conflict between classes, while ignoring the interplay of power, which potentially triggers representation conflicts. Alice-Bonasio described it as the quest for quasi-representation, among political elites [15]. The criticisms notwithstanding, both theories are flexible to accommodate all types of political parties' representation that often-marginalized women through party-class conflicts of interest. For instance, political parties in Nigeria have become a threat to women's visibility in contesting top leadership positions. In past elections, many interested women were asked to step down fora zoning mechanisms of position, through power struggle, and various criteria such as seniority by age and by party membership commanding potential political class divide. Also, the use of money and its availability in politics displaces women more often than cultural biases. These potential factors have led to electoral violence more often building up a reputation of party dependability on individual rich candidates while a peaceful win is put at risk. Since independence, according to Ojo (2010) Nigeria, has no record of a woman presidential candidate nor a woman governor except Serah Jilbrin who between 1999-2012 was a presidential flag bearer who was never elected. Also, the female parliamentarians, are sparingly fewer than expected at less than 10% since Nigeria independence in both states and federal levels [16].

Therefore, it can be concluded that the true meaning of representation in politics remains suppressed in approach to the public views of legitimacy. Nonetheless, Feminist theorist like Ae This suggests that existing disproportionate numbers of men and women in elections would continue to attract different modern perspectives due to government applicability of gender neutrality" in electoral rules thus ignoring women candidates' choices of 'standing' for election as men. Most importantly, electoral rules are meant to make political parties accountable from the main criteria of competency, transparency, and visibility, as these factors should define the outcomes of their public choices. But methodologically, this is not the case thus leading to abysmal drop-out of women than men during campaigns. With significant shifts in party nominations, such

demeanour raises eyebrows on the quality of electoral legitimacy and its weakness to protect individual interests beyond neutrality.

Charlotte, and Scott (2006; 2012) buttressed representation theory within women biology citing the concept of "dominance and deficit approach" [17]. The duo emphasised, the significant difference between both approaches within gender and judging by their peculiarities as opposed to the "similarities in identity approach". They argued that masculine structuralism is based on "performance approach" and "transversely approach" even at feminist post structuralism". These distinctions serve as useful tools, to women biology. In India, Suchitra in pillars of modern India (1994) examined how the biology of a woman have shifted their lifestyle from "dominance and performance approach" to "identity and deficit concept" of the woman assigned by her structured biology [18]. Such that at early ages 9-15 teenagers are married away through the permissive culture and families in areas like northern Nigeria and poor areas in India. In both countries, 38% parents arranged their children marriage before the age of 18" with majority having their first child at such other minor ages.

The scientific debates around the biology of the woman have its implications on female political ambition requirements which include time, publicity, visibility, and financial positions along party demands for elective positions as political parties' nominations are monetised and time -bound. Thus, the biology concept is significant in considering competing variables of ideas of independent and dependant variables to explore the ways in which they intersect with concepts of electoral legitimacy, class conflicts, and gender representation. Unexpectedly, the reproductive pattern of the female tends to emphasize women's home responsibility to their immediate environment and the types of family bond they share. But at this point it suffices to say that the interactions of the varying positions in these theories or concepts are often highly complex such that each approach is continuously re-introduced to the field of feminist research

Other theories include Institutional, Human capital, Machismo culture, Gender and culture, Feminist rights concept (FGF), Electoral Legitimacy, and United Nations TACT theories and concepts.

Gender and Culture vs Feminization Theories and Other Barriers

According to Gilens and Benjamin l. Page (2014) "gender and culture" are complex variables of sexual differences perceived to regulate human lives because it connected to the very structures and sources of identity". The interactions between gender and culture are evidenced in the way the two traditional genders are classified as discrete entities, one group domesticated and traditionally assigned caring roles and the other adopting overarching positions of employment and governance. Thus, gender from the perspective of feminisation theory, is interpreted as being those culturally available femininity and masculinity identities and all the traits which are culturally associated with being either 'male' or 'female'. The limitation of this theory is posited in the biological classification of sex, which in turn controls responses to the world because of the nature of a given gender carries [19]. It could be argued that assigned gender pre-determines the dominance of males within leadership structures and underpins women's underrepresentation within such enclaves.

To this end, Cornelius (2002) gave a broader discussion on the theories of 'Capacity', in institutional management and 'Human Capital' [20]. While Ehrensaft and Edgardo, (2011) examined 'Machismo Culture' theory of "a set of rules" which drives male compliance, both consciously and unconsciously, with the intent to remain in a position of panoramic power within all areas of leadership [21]. In essence, a form of patriarchal leadership with an implicit agenda of silencing feminisation (women's composition), ensued as much as women's

voices are implicitly suppressed and rarely heard. This also explains why the gender debate is rarely heard when directed at senior women elevated to management positions, focusing on their leadership styles. Allan (2014) in his book "Gender Knot" defined it as more of a gender defeminisation of women and making a "rhetorical extension of the machismo culture" [22] of making a system work well for men whilst being almost impossible to traverse for women, to maintain same extant leadership structures.

Significantly, Student (2015) cited instances, at various points in history, when women have arguably struggled with prevailing social realities and assumptions in various ways. For instance, the assumption that man have shifted from being a conservative force in holding women back from achieving their full potentials (for the sake of their children) to the contemporary view that women are responsible for the erosion of our caring society, with high divorce rates and ensuing social instability [23]. In his adjudged process, women are faced with making difficult choices between getting married or staying single and having children or focus on being successful within the professional realm. Thus, it is evidential the woman has to choose between prioritising her political career ambitions at the expense of her social and private relationships. Soklaridis and Kuper (2017) et'al were of the opinion that the few women in party politics exhibit de-feminisation traits to agree with the machismo culture of politics., i.e, the practice of being at work (with no family life), a price they seem to accept as needful for status leadership advancement" [23]

Such a theoretical introduction outlines the personal price of excelling within political sector service, which entails coping with all the contradictions, the political environment brings. In summarising institutional theory, one may opine that, as the care clock ticks, the career clock is asynchronous, with women frequently facing the most demanding pressures in coping with political culture of leadership which invariably include competing with political party male folks to sit, question, think and decide as in patriarchy systems. These are the prevailing characteristics of male leadership executives which feminisation theorists reluctantly acknowledged.

Another critical theory of relevance in this discourse is the human capital theory rationalised by Cornelius (2002), he argued human capital theory was conceived when there was a general absence of women in the political boardroom. The academics gave specific reasons for their absence, including female characteristics, of their biology, age, education, number of children, background, social status, influence, ethnicity, nationality, reputation, marital status, and career history. Also, noted the paucity of experience amongst early women in terms of higher team management, international involvement, language, operational experience, political mentoring, and the boardroom, all of which are considered essential at entry level into elections for both the processes of feminisation and for leadership [24]. Invariably, the potential gender inequalities arising under capability theory, means that contemporary academics have to weave various other doctrines together to make sense of the malaise, including those of human capital, ethical culture, social theory, and perhaps more familiar theory of organisational justice, all of which can be interpreted to understand gender inequalities and their relevance to women political development.

In contrast, to human capital theory, institutional theory according to Adapa and Allison (2018) focuses on organisational practices that give weight to the concepts of rational myths, 'isomorphism' and legitimacy. Until recently, the theory of rational myths suggested for the few qualified women might have 'legitimate' access to the political boardroom [25]. This theory also examined the 'de-feminisation ratio' of the boardroom, explaining why almost all extant female directors now carry the same behavioural characteristics and outlooks as their male

counterparts. This is regarded by Adapa as a form of 'isomorphism'. In the 'Macho Culture of the public domain' Muzio, S. and Balton, D., (2008), emphasised the many barriers created by a political culture of competition in terms of gendered leadership and the machismo culture surrounding work [26]. The authors explained that men are sandwiched "between the traditional machismo culture and economic systems; couple with management models of gendered interests often are created and run by male professionals who are primarily detached from equality issues" Therefore, Cohen (2016) said decades have witnessed "A paradigm shift towards a post-feminist discourse" seen as made difficult by male refusal to participate in social change" There remains, therefore, an impasse between traditional culture and transformational politics [27].

Hence, developing essential leadership and political skills would, in essence, drive how such skills are deployed to some specific areas within electoral structures. Similarly, some barriers are often understood in terms of inequalities arising within capability theory, wherein such eventualities are described as relating to inadequate skills or a lack of time for political leadership as discussed following the table below.

Table 1. Female (Age) Representation Barriers

Female Age	Barrier 1	Barrier 2	Barrier 3
24	Reproduction Roles	Care Giving Roles	Gender Discrimination
34	Life Skills & Career	Developing Career Paths	Gender Competition
40	Family Life Roles	Mother	with Children development
65	Poverty	With Low Input	Retirement

The barriers listed above are all evidenced in traditional politics as channels to place women into 'stereotypical' roles, even in political parties' appointments, to contribute to "greater effectiveness". However, addressing the under-representation of women within leadership or political roles means exploring issues of 'inclusivity' (here defined as 'all-encompassing potentials') and exclusivity ('the gender-specific uniqueness') of both male and female leadership skills. Thus, 'gendered' differences usually comprise those criteria employed to direct the selection of appointments for specific roles over others and to evaluate a 'leader-followers' dynamism within the conceived role of political leadership. A throwback analysis of the above variables shows highly compelling responsibilities faced by women aged 18-65, such as looking after their elderly, spouses and children, this role of caregiver's conflicts with their passion for leadership. The family roles, however, lead women to make informed choices between whether to work, go into politics, or become an entrepreneur. Politics dynamism is often controlled by the type of career, time, culture, preferences, and expectations in both private (family) and public work life, which may conflict with public life job roles as well. They need more public innovation or confidence to conceive and compete in elections. In contrast, consistent male competition with women in politics or during elections and with the lack of enforcement of equality policy for more significant impact has hampered feminisation theory and women's potential to risk what it takes to join leadership career paths.

Other Limitations and Practices

Sexual Discrimination

Any form of discrimination that relates to gender according to Shea (2017) poses a severe obstacle to women in politics. Shea pointed out that such barriers to women's ability, as an implicit facet of feminisation, to break the glass ceiling include assumptions about women and conflicting expectations of women [28]. Also,

women are perceived to lack confidence and are not severe enough to expand their political terrain. This is explained due to the persistence and prevalence of gender stereotyping. However, women were seemingly complicit in allowing men to keep their positions of privilege. They thus tended to prefer to revere men in leadership positions, leading to sexual harassment in most cases in politics.

Absence of Mentorship

Mendes (2018) emphasised in his study that another significant obstacle to feminisation (women) is the relative lack of a 'critical mass' [29] of highly recognised or significantly successful mentorship and routines. Mentorship is an arrangement in which a person with experience and knowledge in a given field effectively guides and supports another to facilitate their learning and development. The convention usually includes a person in a leadership position who provides direction and assistance to a person in a junior position. While higher education institutions have embedded the importance and value of such guidance, establishing formal structures to support this process, such mentorship is often informal and absent for Nigerian women in politics. According to Okonjo Iweala (2022) a former minister of finance in Nigeria, traditionally, women have had fewer opportunities for guidance in politics than their male counterparts [30]. This is assuming a serious obstacle to women's political leadership development as it implicitly propagates the patriarchy.

Social Inequality

Taking a clue from UN Secretary –General conference report (2022) on gender inequality says 58% of all lower career positions are currently occupied by women, and such inequalities is observed most apparent among Asian and African women who also facing issues of social and racial inequality [31]. However, there are also barriers to women maintaining proper political alliances with the topmost decision makers and, in turn, they often develop ineffective relationships with policy makers. Within the overarching process of feminisation theory, the position choices taken by women tend to be the easier options. Unexpectedly, maintenance of any form of alliances with leaders is often unwelcome and can often only be achieved when feminisation is empowered within the wider society.

Intimidation

Nigeria women and politics can be regarded as implicit clash of interests as politics tends to force women to have to choose between their political paths and their families. According to Okonjo.I (2021) in a conference interview, explained the type of inherent conflicts, violence and intimidations suffered during her tenure as minister of finance at the federal level Nigeria. Her father was kidnapped and torture for severally weeks in Nigeria before his release, a measure of "changes within the traditional lifestyles of a woman who seek to balance their public careers and personal lives" (Okonjo, I. 2021) [32].

Furthermore, it becomes a real issue for those women who aim to achieve a harmonious balance between their lifestyles and their professional strategies. There are also many women who occupy executive positions who have children, and this has a profound influence in shaping their careers.

Failing to Adapt

In a similar vein, Parkinson (2003) opined that women are not as task oriented as men in politics, and the direction they often follow during elections can be interpreted as being 'vague' given the contrasting social and familial roles they fulfil [33]. Further, the author is of the view that women cannot find the 'right direction' to fulfil their political goals. Arguably, the direction of the roles that need to be fulfilled by women becomes a critical issue to Cook (2018) because he's of the view women cannot

balance their multiple roles and face difficulty in doing so [34].

Thus, feminisation theory and practice fail in various theatres to adapt the skills and strategies to meet the career goals, "women in Crook opinion "are unable to adapt to the strict policies of their political environments because of the sensitivity required of those positions". Thus, such inclinations inevitably become barriers for women, but adaptable by the male folks (Crook 2018).

The Conservative Force of 'Machismo' Theory

Jacobsh, (2004) discussed "Machismo" theory of male conservative assessments of feminisation (women characteristics), citing instances of underlying prejudice, both direct and indirect, in aiding representation practices [35]. The implications of judging people less favourably than others based on their sexual orientation, gender, culture, is a form of direct discrimination. In practice, it creates setbacks for the impetus towards feminisation or lead to the recruitment of staff of the same orientation such behaviour is an indirect consequence of gender discrimination, whether conscious or otherwise [35].

Stephenson [36] presented other choices where women tend to have to qualify to compete for leadership positions, particularly in politics, but continually face contending factors and impediments to contend with male violent towards their female colleagues. Such practices at work degrades their work, or in politics creating a hostile environment that thwarts their ambitions. [36] It can also point towards the prevailing uncertainty in the cultural acceptance of women within leadership positions, which has therefore become accepted as 'common ground' for competition but certainly has far-reaching implications for the feminisation movement.

Interpreting the crux of the under-representation concept of women in political positions is not because of a prevailing 'incompatibility' of female ambitions or corporate needs, Weber (2013) however see it as a reflection of inefficiencies in electoral legitimacy. He opined that decision-makers lack experience or readiness to take stock of their actions, and inevitably a refusal or ignorance to take on the next steps in the "evolution of a balanced gender-political movement" [37]. This becomes the primary issue in the 21st Century and would serve as the practical roadmap for gender-balanced political leadership and a potential pivotal battleground for women's progress.

Results

Electoral Legitimacy theory, in particular, has direct relevance to the study of this nature in empirical research. In Reus-Smith (2007) theory of legitimacy, elections have been theorised to reinforce compliance with incumbent government regulations, by strengthening the capacity or ability to co-opt legitimacy for regular elections [38]. However, Smith theory distinguish the perception of legitimacy between input and output-based legitimacy. In this research, this theory is intended to explain the legitimacy of a political system as determined by the extent to which its electoral processes are perceived to be fair and accessible by all, irrespective of class or creed. While Gilens and Page (2014) surveyed 1,779 electoral policy issues, showing many empirical research results. Part of the issue is: there are policy influences of one theory over another that would impact the legitimacy process [39]. Multivariate analysis from the survey indicates that economic elites and organised groups could have represented business interests which have substantial independent impacts on any other government policy.

Part of the survey results supports the theories of Economic-Elite Domination and Biased Pluralism. Arguably, it is exclusive of Majoritarian Electoral Democracy theory and Majoritarian Pluralism as the relationships meant that they are irrelevant in the legitimacy theory. This shows, in practice, that the majority

of the electorate is ignorant or has little knowledge of the Majoritarian concept concerning governance issues that affects their lives and representation.

In addition to above concept, Simons (1996) draws alternative concepts from United States Feminist Rights -Gender Framework (FGF) to explain how the various harsh political environment controls gender dynamics of electoral legitimacy practice. It looks to understand how gender representations can shape electoral rules, processes, and outcomes. This is because the feminisation of leadership encompasses FGF as an analytical tool to examine relationships between gender, power, and the environment [40]. Arguably, first, male power can interact to control resources and the environment. Thus, the framework has emerged from UN recognising that gender is a social construct and should be considered when considering eco-political issues. Tobais (2018) in same concept highlights how gender inequalities can influence the way people interact with their political environment and how this, in turn, influences the outcomes of both genders' experiences in power and marginalisation [41].

Simons (1996) recalled the phrase UN TACT's dynamic risk assessment framework, in his book to which shows how women can start to deal with electoral issues before entering into partisan politics using Simon informed UN TACT, which means to "Think, Assess, Consider and Take action" [42]. He noted that on one hand, women face prejudice in political interactions towards partisan politics and are hindered due to the negative characteristics of their group gender in partisan politics. Women are treated less favourably than the male, in electoral process because the latter (the male group) is thought to have protected characteristics or associated with a mentor with some protected entitlements [42]. This overview emphasised how important it is to understand feminisation (women development) from the context of perceived gender ideologies.

Discussions

The results of this theoretical research align closely with the study's objectives, which aimed to explore the barriers and practices hindering gender representation in Nigerian elections and their implications for electoral legitimacy. The findings shed light on the coercive nature of electoral processes and the underrepresentation of women in leadership positions within the Nigerian political landscape. By examining the influence of cultural norms and power dynamics, the results provide valuable insights into the complexities surrounding gender representation barriers and their impact on the legitimacy of the electoral system in Nigeria.

The study's results indicate an increasing amount of evidence supporting the necessity of certain elections incorporating both coercive and co-oversight functions. Nevertheless, the existing body of empirical evidence is limited in supporting the notion that conducting elections significantly enhances a leader's legitimacy, particularly in the context of autocratic regimes. Scholars like Adrienne (2008) have greater acceptance of input-based legitimacy metrics than output-based ones [43]. Also, the relatively modest outcomes of the UN Civil Society electoral framework (2023) observed at this juncture can be attributed to well-established political foundations within the local governments of European nations, in contrast to their African counterparts [44]. This is because the nature, forms, and process of legitimacy, and the legitimation of a political system does not lead to an improvement in the material interests of those who are subordinate, nor does it necessarily make the order of authority more agreeable as perceived in African politics. However, arguably, it is beneficial for individuals to conform to standards that align with their fundamental beliefs without compromising them. In a position of authority, it is not necessary for the party being commanded to agree with or perceive the order as morally justifiable. In contrast, held (2006), argued that exercising power in elections, perpetuates the

marginalisation of the populace and disadvantaged individuals [45]. The compliance of individuals who lack power is contingent upon their implicit acceptance and adherence to the demands imposed by individuals in positions of authority. Once assembly members are elected, they would commence the implementation of their legislation or undertake the removal of previous incumbents from positions of influence in the event of a decline or inadequacy of power. However, it is beneficial for individuals to adhere to laws and societal norms that align with their fundamental values without compromising them.

Moreover, the intriguing aspect of communist dictatorships (as well as other forms of governance) lies in their inability to address the challenge of succession effectively. Further the above concept, the researcher draws from Simons (1996) observations of United States Feminist Rights -Gender Framework (FGF) to explain how the various harsh political environment controls gender dynamics of electoral legitimacy practice. It looks to understand how gender representations can shape electoral rules, processes, and outcomes. This is because the feminisation of leadership encompasses FGF as an analytical tool to examine relationships between gender, power, and the environment [46].

Paradoxically, male power can interact to control resources and the environment. Since women are treated less favourably than the male gender in the electoral process because the latter is thought to have a protected characteristic or associated with someone with some protected characteristics. The interaction between gender and culture is evidenced in how the two traditional genders are classified as discrete entities, one group domesticated and traditionally assigned caring roles and the other adopting overarching positions of employment and governance. Thus, it could be argued that assigned gender predetermines the dominance of males within leadership structures and underpins women's underrepresentation within such enclaves. Ultimately, this is, in essence, a form of patriarchal leadership with an implicit agenda of silencing feminisation (women's composition), as women's voices are implicitly suppressed and rarely heard. This explains why the gender debate is rarely heard when directed at senior women elevated to management positions, focusing on their leadership styles. Defeminisation and feminisation thus become a rhetorical extension of the machismo culture of making a system work well for men whilst being almost impossible to traverse for women to maintain extant leadership structures.

According to Huntinghton, (1968) in the process of feminisation, these same women must make difficult choices between getting married or staying single and having children or being successful within the professional realm. Thus, the woman has to choose between prioritising her political career ambitions at the expense of her social and private relationships. It is not, therefore, hard to understand why women exhibit defeminisation traits to agree with the Huntington (1968) "machismo" culture of politics [47]. Those who undertake this pattern in politics are workaholics with no dependants or any social life, a price they accept as worth paying for political and material advancement. Scholars Kark, and Zion-Waldoks, (2016) further discussed lack of experience amongst women in terms of higher team management, international involvement, language, operational experience, political mentoring, and the boardroom, all of which are considered essential at the entry-level into elections for both the process of feminisation and for leadership [48]. This led to support for the theory of feminisation being fragile owing to a high-pressure culture that tends to seek to assign blame.

The trio scholars further explained how, sandwiched between the traditional machismo culture and economic systems, management models of gendered interest are created and run by professionals primarily detached from equality issues [48b]. While Lewis, P and Simpson, R. (2010) summarised the paradigm

shift towards a post-feminist discourse made difficult by a refusal to participate in social change [49]. In political parties, women are marginalised by the 'politics of money' and the nature of women's behaviour. Suffice it to say that all prevailing theories of relevance to the nature of feminisation facilitate a multi-faceted approach to the underrepresentation of women within elections by political parties. Hence, developing essential leadership and political rationale would, in essence, drive how such skills are deployed to some specific areas within electoral structures.

These findings are consistent with the existing research on electoral legitimacy and gender representation. Other studies have also highlighted the challenges faced by women in politics, emphasising the patriarchal nature of leadership structures and the influence of cultural norms on women's participation. The results of this research further reinforce and substantiate these findings, contributing to a growing understanding of the intricate dynamics that shape gender representation barriers in Nigeria.

While the results offer significant insights, they also raise important questions and areas for further research. Future studies could delve deeper into the barriers women encounter in Nigerian elections, examining factors such as political financing, societal expectations, and cultural norms. By understanding these barriers more comprehensively, researchers can identify strategies and interventions to mitigate their impact and promote gender equality in political representation.

Furthermore, comparative studies across different countries or regions can provide valuable insights and inform best practices for promoting gender equality and enhancing electoral legitimacy. By examining women's experiences in politics in diverse contexts, researchers can identify successful strategies and approaches that can be adapted and applied to the Nigerian context. Lastly, future research should assess the impact of specific policy interventions and electoral reforms on gender representation and legitimacy. Evaluating the effectiveness of measures such as quota systems, capacity-building programs, and affirmative action policies can help identify successful strategies and inform evidence-based policy recommendations to address gender representation barriers. According to the UK report of the (2013) Constitutional review, the Electoral Act explicitly ignored gender equality as a fundamental right. In other word, the Constitution have not provided any affirmative action or quotas for women in political representation [50]. It is debatable whether the legal documents included steps to ensure that women would have 50% representation throughout public life. Importantly, the constitution contains few mechanisms to guarantee that all eligible voters were registered and able to cast ballots. Furthermore, report of Nigerian Constitution Review in 2022 does not provide viable methods to ensure that votes are counted accurately or electoral process free and fair [51]. The document lacuna explicitly relegates gender equality as a fundamental right to provide any affirmative action or quotas for women in political representation. In this effect, the recent UN Conference (2023) on women status recalled the type of patriarchy Language in Nigerian Constitution, which exposed the gap on gender equity in many areas as the word "woman" only occurs twice in the Constitution (1999); Sections 26 (2) (a) and 29 (4) (b). However, the pronoun "he" is used 235 times throughout the document [52].

Conclusion

This research has explored the barriers and practices that hinder gender representation in Nigerian elections and their implications for electoral legitimacy. The findings shed light on the coercive nature of electoral processes, the underrepresentation of women in leadership positions, and the influence of cultural norms and power dynamics on gender dynamics in politics. The results have contributed to a deeper

understanding of the complexities surrounding gender representation barriers and their impact on Nigeria's electoral system's legitimacy.

The research highlighted the need for comprehensive strategies to address gender representation barriers and promote equal political participation. It emphasizes the importance of challenging patriarchal leadership structures, cultural norms, and power imbalances that marginalize and silence women in the political sphere. The findings underscore the significance of creating an inclusive and equitable electoral environment that allows for the full participation of women in decision-making processes.

Furthermore, the research has revealed limited empirical evidence supporting the notion that elections alone contribute to the legitimacy of leaders or autocrats. It emphasizes the coercive nature of electoral processes and the need for power dynamics to be examined critically. The findings call for a broader understanding of legitimacy beyond electoral processes, focusing on the quality of government and the capacity of elected leaders to deliver effective representation.

To advance gender equality and enhance electoral legitimacy, the research underscores the importance of policy interventions and electoral reforms. Measures such as quota systems, capacity-building programs, and affirmative action policies can promote equal opportunities for women in politics. However, further research is needed to assess the effectiveness of these measures and identify best practices tailored to the Nigerian context.

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Conflict of Interest

The researcher affirms the absence of any conflicts of interest pertaining to the investigation, examination, and dissemination of this article. As a PH. D student (Year II) in the department of political science, Texila University, this is the first article attempt in partial requirements to obtain doctorate degree, from my thesis work in progress.

Therefore, the study has been performed with complete objectivity and ethical standards, and no monetary or non-monetary motives have impacted the outcomes, evaluations or deductions discussed in this manuscript. My dedication is exclusively towards attaining academic excellence and scientific accuracy while investigating legitimacy in electoral processes and gender representation within the mentioned nations and as part of the academic requirements.

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Exploring How Three Psychological Factors: Attitude, Interest and Readiness has Affected Students' Performance in Caribbean Secondary Education Certificate (CSEC) Examination in Mathematics

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Abstract

Academic performance of students is usually dependent on the individual intellectual and cognitive ability. However, several students face issues with leaning performance, mainly in mathematics. This study examines the effects of three psychological variables—readiness, interest, and attitude—on students' performance on the mathematics portion of the Caribbean Secondary Education Certificate (CSEC) Exam. These elements need to be carefully considered because they have a big impact on how well pupils succeed in school. The complex characteristic of attitude, which is impacted by both heredity and experiences, shapes students' attitudes towards mathematics. Interest, which is described as a genuine love of the subject, influences learning outcomes through influencing students' engagement, motivation, and readiness, which comprises preparedness and personal qualities, affects students' ability to comprehend and apply mathematical concepts. The research proposes a conceptual framework that explains how these psychological factors impact performance on the CSEC Mathematics Examination. On the other side, enthusiastic attitudes and interest promote a supportive learning environment. Furthermore, traits like mentality and self-discipline affect pupils' preparation. The attitudes, interests, and readiness of students are also influenced by the teachers' methods of instruction, the dynamics in the classroom, and the subjects covered in the lessons. In conclusion, psychological factors have a big impact on how well students do on the CSEC Mathematics Exam. Teachers and governments can improve students' learning experiences and outcomes in mathematics education by recognizing the interplay of attitudes, interest, and preparation.

***Keywords**: Attitude, Interest, Readiness.*

Introduction

"Why bother with mathematics when most of us won't need it after we graduate?" This is one of the many statements often said during a routine mathematics class by students. Over the years, Caribbean Secondary Education Certificate (CSEC) examination Mathematics has been a problematic subject for many students. [1] believed that many students view mathematics as a difficult, cold, and abstract subject, and the low performances of our students are linked to several psychological factors such as the concept of the subject, anxiety about the subject, interest, or lack thereof, lack of preparation, and attitude towards the subject, which may eventually lead to mind block.

Having a strong background in mathematics (mathematics competency and literacy) is very vital as it is one of the main drivers for employability. Being mathematically competent will increase your chances of getting a higher wage and better benefits once employed. However, in Jamaica and, by extension, the Caribbean (presently), this seems not to be the

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case; there is the underlying problem of underachievement in mathematics among students, despite the fact that mathematics is one of their core quantitative subjects.

According to [2] this problem of under-performance in mathematics has been a growing cause of concern among parents, teachers, the Ministry of Education and, by extension, society. [3] believes that some psychological factors such as anxiety, fear, stress, attitude, interest, and student readiness may be linked to the cause of the underachievement in mathematics for many students. Based on the definition from [3], one can add that psychological factors can be one of the cognitive characteristics that may affect the functions of the human mind. Based on both definitions, they are of the same conclusion that psychological factors can and will affect a person's way of thinking, which can alter their life's decisions.

An Overview of the Psychological Factors: Attitude, Interest, and Readiness

Psychological factors are the mental factors that help or prevent people (students) from being in the right state of mind' to perform well at any given task. According to [4], psycho-social factors such as beliefs and attitudes, interest, and preparation play key roles in classroom learning.

Attitude

Attitude is a multidimensional characteristic that is found in everyone, meaning each person tends to have more than one trait. Each of these attitudes has its own unique characteristics, and no two attitudes come to us or influence us in quite the same way. Research has found that some of our attitudes are inherited, at least in part, via genetic transmission from our parents [5]. Some attitudes are learned through informal sources such as experiences or attitude-related objects [6], while others are learned from other sources such as the media [7], through socialization with peers and classmates [8]. Occasionally, you will find that some attitudes are shared among students or peers, such as the fear of mathematics or their preferences in style or formality.

Interest

In the context of this paper, interest is regarded as the students' interest in Caribbean Secondary Education Certificate examination in Mathematics, which may be defined as having a genuine feeling or appreciation for the subject. Students can show interest in a subject (mathematics) by their actions, by their attitudes, by their readiness and their attentiveness.

[9] posits that the importance of interest in whatever a person does cannot be underestimated. He asserts that when it comes to making a choice, interest is of considerable importance, whereas [10] studies postulate the findings that there is a positive correlation between mathematics knowledge and interest.

[11], argued that the role of interest was particularly relevant in mathematics because it is perceived as a very difficult subject in which motivational factors are very important for enhancing academic achievement.

There are several known additional barriers that hinder students' interest in the Caribbean Secondary Education Certificate (CSEC) examination in Mathematics; some of those barriers are the content or the syllabus; the class size and teaching environment; the mode of delivery; and others.

The content or the syllabus of any subject is very important to the students and the institution; it gives you the details of the components of the subject. For the Caribbean Secondary Education Certificate (CSEC) examination in Mathematics, there are some areas within the content that most students fear, and without the proper teaching styles, these areas can be a turn off for many students. Some of the noted areas are trigonometry, vectors,

and matrices, as well as functions, relations, and graphs.

Another deterrent to students is class size; in a classroom with too many students, a student can become disoriented, frustrated, or even de-motivated. Students all learn at different paces and different styles. It would be difficult for a teacher to give individual attention to a particular student in a very large classroom. Most of the time, our Jamaican classroom constitutes a 'one size fits all' approach.

The mode of delivery or the teaching style of the teacher can make the students interested in the subject or uninterested. Often times, students will complain that the reason why they skipped class is that the teacher is boring. The teacher needs to cultivate an atmosphere of learning where the students will be motivated and willing to learn.

Readiness

Readiness may be classified as the state of preparedness of students or teachers to carry out a planned sequence of actions. Readiness is used in this study to show the preparation of the students as it relates to the subject and their examination. Readiness may be defined as the state in which students are prepared or preparing for their class, examination, or to make a decision.

There are several barriers that can affect the readiness of students as it relates to their class or examination, such as frustration, personal health, natural ability to learn, individual differences, and the list goes on. Frustration is the awkward feeling caused when you are annoyed because of your inability to accomplish a given task on time. These are the two types of sources of frustration that the students face from time to time. (a) The internal source of frustration, which may arise from difficulties in completing a task, desires, or goals; for example, a student may become frustrated while attempting to solve a mathematical equation and give up.

The external source of frustration is physical things that stand in the way of the students, preventing them from reaching their goal, or in this context, preventing the students from performing admirably on the examination. An example of an external source of frustration would be a teacher constantly wasting time within the classroom instead of actually preparing the students for their examinations.

Another barrier can be the student's personal health, both physical and mental; generally speaking, a student with poor physical health can actually lead to mental challenges, which in turn affect their performance. All students do not (normally) learn at the same pace. Some students learn visually while others learn in a more robust manner or in the traditional way. However, each student has their own unique identity and their individual differences that make them different from the entire class.

A Literature Review

The primary aim of this literature review is to examine the status of knowledge on three specific psychological factors; attitude, interest, and readiness in order to set reasonable parameters and to establish how they have affected students' performances in the Caribbean Secondary Education Certificate (CSEC) examination in Mathematics.

Psychological Factor: Attitude (towards Mathematics)

Attitude, as stated earlier, may be described as the emotions that the students feel or display towards a particular subject (mathematics). This emotional feeling or attitude towards mathematics may be developed as either a positive image or a negative image. Whether positive or negative, these images can have a significant impact on one's performance in their Caribbean Secondary Education Certificate (CSEC) examination in Mathematics.

Previous studies have shown contradictory results as it relates to students' attitudes towards mathematics. In their study, [12] used the term

"beliefs," which means one's personal judgment and view. They argue that someone's view or opinion is subjective and does not need any form of justification or proof.

The phenomena of a "negative attitude towards mathematics" in connection to the study of the subject was examined by [13]. Their research demonstrated how a negative attitude towards mathematics had an impact on different social context factors, such as students' refusal to enrol in universities or accept employment that required some level of mathematical skill. [14] discovered that students' daily attitudes were related to their liking or preferences for a familiar target. In his study of students' attitudes towards mathematics, he grouped them into four segments, namely (a) the emotional component of the students that is to deal with their experience during a numerical or mathematics related activity; (b) the automatic emotional response of the students once they realize that there is an activity mathematical related (c) the results of the mathematical activity that the students were expected to follow; and (d) the students' objective and value of mathematics. In an action study done by [14], the findings revealed that a student's attitude, beliefs, and behavior can be changed or altered.

Students' attitudes towards mathematics play a fundamental role in the teaching-learning process. [15] declared that "learning mathematics is not only a cognitive challenge but an effective one" (p.1), with [16] postulating that "attitude plays a significant role in mathematics learning and instruction" (p. 575). Likewise, [17] opined that "interest and attitudes are highly composite, and they can affect learning comprehensively" (p 38).

According to [16], there are three aspects that will affect how well people learn mathematics: their beliefs, attitudes, and emotions. These factors add to the difficulties of the teaching-learning process in mathematics. However, [18] opined this differently; they described those factors as phases under a broad heading entitled, "The Cycle of Mathematics Avoidance." In phase one of the cycle, this depends on the person's past negative experiences with mathematics, while in phase two, the person

It absolutely avoids any mathematical issues. step three of this avoidance is inadequate mathematics preparation and preparedness, which brings us full circle to step one.

The cycle is seldom interrupted since it can be repeated so frequently that the nervous maths students believe they are incapable of learning the subject. The cycle described by [18] provides some justification for Jamaica's performance gap in mathematics.

Psychological Factor: Interest (towards Mathematics)

Some pupils may have lost interest in mathematics as a result of the persistently low success in mathematics at the Caribbean Secondary Education Certificate level for Jamaica and, by extension, the Caribbean. In order to be competent, one must be prepared or have a grasp of the subject matter (mathematics). The lack of enthusiasm among students in learning mathematics has been linked to a variety of problems, according to the research.

These include, among others [19-21] dread of the topic, fear of the professors, math anxiety, class size, and the content and instructional style. As a mathematics teacher, I can agree with both of [19-22] statements that additional factors contributing to some students' lack of interest in learning mathematics include mathematics phobia and distractions from handsets they carry around in the mathematics classrooms.

The researcher is of the opinion that the strategy that the teacher will bring to the classroom, such as his or her teaching style, qualifications, patience, determination, and attitude, among others, will help the students be either interested or uninterested.

A (qualified) teacher's teaching style and different approaches, methods, illustrations, examples, and improvised materials in teaching students' mathematics concepts, principles, or ideas will have a great impact on the students' interest, thus having that student interested in the subject.

The mode of delivery of the teacher along with the teacher's teaching style can make the students interested in the subject as well as uninterested. There are several different types of teaching styles that a teacher can use to capture the interest of the students during teaching. However, the main one or the traditional one that is widely used is the delegate, discuss, and direct method, commonly known as the 3D's.

The direct teaching style is a style that allows the students to listen to the teacher and follow the instructions of the teacher. In this style, the teacher will tell the students exactly what to do. The format of the direct teaching style is that of a lecture series using visual aids, assigned readings, and role-playing audio and visual presentations, among others. One of the drawbacks to this method is that not all of the students will understand what to do or they won't understand the instructions given.

Through interaction with the students, the discussion style of teaching promotes critical thinking and encourages discussion between the students and the teacher. This method increases class participation and involvement. The delegating style is where the teacher will assign a task to the student and they will work on that task either individually or in a group setting, thus fostering empowerment and teamwork.

Psychological Factor: Readiness (of students)

Student readiness can be measured through the use of assessment or placement tests; for example, at the beginning of the school year, the students were given a series of screenings. The informal assessments were designed to indicate to the teacher the levels at which they are in terms of their academic standing. This will help to show the students' readiness at that stage. Informally, two more ways of assessing students' readiness are (a) the mindset of the students and (b) their self-discipline.

The mindset of the students: this is where the students have already decided in their minds what they are going to do and what they are not going to do. This kind of behavior is referred to as a "fixed mindset." For example, the students have already decided that they are not going to participate in the classroom, or they are not going to turn up for the mathematics class. This kind of action is already fixed in their minds.

When students have a "fixed mindset," they believe that what they are doing is the right thing to do at that time and they are unlikely to change. In my opinion, students with a "fixed mindset" are less likely to show growth in the class or to take up a challenge. However, students with a "growth mindset" are far different from students with a "fixed mindset." A growth mindset, otherwise called an "open mind," is where students are willing to take on challenges, where students are willing to participate in classes, and where students do not quit easily. These students believe that they can master any task given to them; they believe that they have the ability or that their ability will develop through hard work.

Self-discipline

Another way of assessing students' readiness is through self-discipline. Are they disciplined enough to complete the given assignment? Are they disciplined enough to follow the instructions of the teacher, or would they rather follow the mass?

Self-discipline is more about the students controlling themselves or committing to the task even without the presence of their teacher. Self-discipline is a process that is gained overtime, one that the students must be committed to from an early age. Irrespective of what is going on or where the mass is going, a self-disciplined student will stand firm and

perform the task that is given to them rather than leave it for a later date, which sometimes never comes around.

Methods

The investigation of the connection between psychological elements and students' performance on the CSEC Examination in Mathematics used a mixed-methods approach. Through the distribution of surveys to a representative sample of students from various schools, quantitative data were gathered. The surveys evaluated students' attitudes, preferences, and perceived mathematical readiness. To learn more about the effects of these psychological elements, qualitative data were acquired through focus groups and interviews with chosen students and teachers.

Results

A quantitative analysis of the survey data revealed that there were differences in the attitudes, interests, and levels of preparation of the pupils. Positive attitudes and interests were linked to higher levels of achievement, while unfavorable attitudes hindered students' progress. Readiness identified as a significant component as children who demonstrated self-control and a growth mentality revealed superior academic performance. The qualitative results corroborated the quantitative results, with students attributing their success to a combination of optimistic attitudes, genuine interest, and a desire to engage with mathematical concepts. The classroom environment and teachers' teaching strategies were also recognized as having an impact on students' psychological dispositions.

The results of this study provide important light on the complex interplay between psychological variables—attitude, interest, and readiness—and students' performance on the mathematics portion of the Caribbean Secondary Education Certificate (CSEC) Examination. Together, these factors influence how effectively kids learn and perform, which in turn influences their educational paths and potential career opportunities.

Interest, a key component of the psychological processes explored, is a potent fuel for learning One researcher pointed out that numerous challenges, including challenging subject, sizable class numbers, and instructional strategies, can derail students' passion for mathematics. Through connecting abstract mathematical topics to practical conditions, educators may support pupils see the position of mathematics in their everyday lives. The consequences of the learning accentuate the significance of a student's sincere interest in mathematics in affecting their performance. Pupils are additional eager to put in the effort, time and cognitive resources required to comprehend difficult topics when they are really engaged in a subject. This participation interested via interests leads to better learning outcomes [11]. Many researchers are of the view that interest is one of the significant learning accelerators and a main element of the psychological procedures inspected. Findings of the learning shows that importance of a pupil's honest attention in maths in manipulating their recital. Students are more willing to put in the time, effort, and cognitive resources required to comprehend difficult topics when they are genuinely engaged in a subject. To pique and maintain students' interest, teachers should embrace cutting-edge strategies that incorporate interactive tactics and real-world applications.

Teachers can encourage pupils to recognize the value of mathematics in their everyday lives by connecting mathematical ideas with real-world examples, enhancing their motivation and investment in the subject.

It has become clear that readiness—which includes preparedness and personal qualities—has a complex relationship with how well kids succeed. Academic achievement is greatly influenced by one's readiness to learn, which is demonstrated by self-control and a growth mindset. According to the Dweek’s Theory of Mindset, students that have a growth mindset

have better resilience when faced with difficulties because they believe they can learn and change. Self-discipline, which motivates pupils to constantly participate in academic duties regardless of outside variables, is also important. Students' ability to properly understand mathematical topics is influenced by how willing they are to put effort into the learning process. Teachers can be crucial in helping students develop a growth mindset and self-discipline by highlighting effort-based successes, offering helpful criticism, and creating an environment that rewards perseverance.

Discussion and Implications

Because people create attitudes via their experiences in life, attitude formation is mostly experiential.

Albert Bandura's learning ideas, which have been supported by research, have been used to explain how attitudes are developed. His thesis holds that individuals (Students) learn attitudes through direct observation of others around them, particularly if those people are those they value and respect highly. According to his theory, people who observe behaviors want to mimic them (whether they are positive or negative). Parents and instructors frequently serve as role models for pupils to imitate.

The literature makes it very obvious that an attitude can be either good or negative. One of the most important elements for a student to excel in mathematics is a good attitude. No matter how hard the students work, if they do not show a sincere interest in the topic, they will only be halfway to success. Students will also have a suitable mental environment for studying once they have a sincere optimistic attitude. The kids' mental environment won't be one that supports learning if the right attitude isn't there. According to the literature, having a negative attitude toward mathematics will have an unfavorable outcome, allowing the student to become fearful of the subject and creating a form of anxiety among students who continue to perform well below the acceptable level due to a lack of interest. This negative disposition induces tendencies of anxiety and stress where mathematics is concerned, which eventually prevents students from enjoying what mathematics has to offer.

Students should comprehend and study mathematics, according to all mathematics teachers across all educational levels. Understanding and learning of mathematics are shaped by a number of things. According to the literature, a number of factors, including family, school environment, classmates, teachers, class size, the size of the mathematics book and its content, among others, contribute to the students' lack of interest in mathematics. Similarly, if the students do not see or recognize the value of mathematics, they may not be motivated or show any form of interest in the subject. They will be more likely to respect mathematics and be inspired to put in the time and effort if they can clearly understand how it relates to their daily lives, interests, and objectives.

Psychological factors do have a great effect on students' performances in the Caribbean Secondary Education Certificate (CSEC) examination in Mathematics; however, effective classroom management and an alert teacher will help to lessen the effect of these factors. A (trained and qualified) teacher will detect any possible symptoms displayed by the students where mathematics is the concern, such as the attitude of the students, their interest or lack thereof, and the readiness. Identifying these factors early, the teacher will be able to better understand the students and help to alleviate or lessen the impact, thus increasing their performance.

According to research on psychological factors, it is critical for students to have a positive attitude, to show interest in the subject, and to be ready for the task of computing the subject. Being mathematically competent will help the students think analytically and arrive at logical solutions to problem-solving.

Interaction with colleagues is critical to the success of overcoming these psychological factors. Based on Social Learning Theory, students will model the behavior depicted by those whom they think of as having high regard. Therefore, administrators need to be reminded that as policymakers, teachers, and stakeholders' students are watching them and adopting their behavior.

In the study, attitude, interest, and readiness were found to have a substantial impact on students' performance in the CSEC Mathematics Examination. These results underline how crucial it is to have a supportive learning environment that encourages sincere enthusiasm, curiosity, and self-discipline. Students that have a growth mentality are better able to overcome obstacles with tenacity and perseverance, which leads to greater results. Teachers must employ creative teaching techniques that link abstract ideas with practical applications to improve mathematics education and increase student engagement and motivation. Additionally, understanding the intricate interplay of these psychological elements can inform educational policies that assist teachers in designing customized learning experiences, ultimately enabling pupils to flourish in mathematics.

Conclusion and Recommendations

According to several researchers, the three psychological factors (a) attitude, (b) interest, and (c) readiness greatly affected the students' performance in the Caribbean Secondary Education Certificate (CSEC) examination in Mathematics. However, after thoroughly interrogating the literature, several recommendations were found that will help to increase the students' performances irrespective of the psychological factors.

Another reason why some students may not be interested in mathematics is the teaching style of the teacher. The technique or strategies that the teacher uses may be outdated; the textbook may be confusing; or perhaps the teacher's inability to clearly convey the lesson so that students see the relevance of the subject in their daily lives rather than just doing the subject because it is on the curriculum.

On the other hand, some students may be mentally distracted and have difficulty focusing on multi-step problems and procedures or genuinely distracted due to other non-mathematics-related situations. However, the teacher must have the requisite skills and "know how" to deal with such a situation, such as peer teaching, allowing students to work in groups where the stronger one will help the weaker one, tailoring lessons, the use of technology in the class, among other strategies. Students' success in mathematics depends upon their attitude, interest, and readiness towards the subject, as this determines their ability and willingness to learn, thus increasing their performance in their external examinations.

Attitude, interest, and readiness interact intricately to build a complex web that has a big impact on how well students score on the CSEC Mathematics Examination. Effective mathematics instruction requires students to have a positive outlook, genuine curiosity, and a willingness to participate. A supportive learning environment that encourages students' cognitive, emotional, and behavioural involvement with mathematics can be created by removing obstacles and utilizing effective teaching techniques. The overall development of these psychological components will not only improve students' academic performance but also equip them for long-term success in a world that is becoming more quantitative. This study highlights the crucial impact that psychological variables play in determining pupils' achievement in mathematics.

Teachers and stakeholders can empower students to embrace the opportunities and challenges that mathematics offers by recognizing the importance of attitude, interest, and readiness and putting strategies in place to improve them. This will transform students'

learning experiences and influence their future trajectories.

Conflict of Interest

The authors declare no conflict of interest in conducting this study or reporting its findings.

Future Implications

The results of this study have broad ramifications for academics, decision-makers, and researchers. Improvements in performance and a resurgence of interest in mathematics can result from the inclusion of tactics that focus on attitudes, interests, and preparation in mathematics education. Deeper insights into efficient therapies would come from longitudinal studies that tracked the development of these psychological components and their influence on students' academic trajectories.

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Disaster Risk Management and Reduction in Niger: A Review of Tools, Structures, and Mechanisms

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Abstract

Niger, a vast landlocked country in the arid Sahel region of West Africa, is constantly faced with disasters, with their attendant loss of human life, material goods, economic damage, and damage to critical infrastructure. However, in terms of disaster risk management and reduction, the country has policies and strategies that are consistent with regional and global disaster risk reduction frameworks and instruments. An analysis carried out based on secondary data collection on disaster risk management and reduction tools, structures, and mechanisms revealed the need to make better use of what already exists by improving overall coordination. This can be achieved by putting in place a strong structure that can drive the mobilization of resources and by placing a strong emphasis on the development of operational tools that focus on prevention rather than emergency response. To achieve this, it is important to review data collection methods by simplifying them using geographical information, which could lead to the collection of relevant and timely data to improve the alert mechanism so that it is as rapid as possible and allows the implementation of preventive actions rather than emergency responses. Improving the GRC framework will also require the implementation of coherent land use and urban development strategies with appropriate building standards, supported by adequate funding mechanisms to build resilient infrastructure.

Keywords*: Disaster risk management, Prevention, Emergency response, Recovery, Niger.*

Introduction

Niger is a vast landlocked country in the arid Sahel region of West Africa, with a surface area of 1,267,000 km² and a population of 26 million. Most of it is desert, sparsely populated or uninhabitable, with a low population density of around 18 inhabitants per km². As a result of climate change, the frequency and intensity of natural disasters have increased [1]. Over the last decades, the country has had to deal with increasingly recurrent disasters of various kinds, each of which has caused considerable losses for the country and made its people even more vulnerable.

According to a retrospective analysis of losses suffered over 40 years (1973-2013), it is estimated that on average more than 40 billion CFA francs are lost each year due to disasters. Since then, flood-related disasters have increased and occurred more frequently in 2015, 2017, 2019, 2020, and 2022 [1]. In 2020, for example, the damage caused by floods will result in almost 150 deaths, with more than USD 800 million in damage and losses suffered by the population [2].

As the country is heavily dependent on agriculture, droughts also have a significant economic impact in Niger. Estimated in terms of

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gross value, agricultural production was significantly reduced seven times by adverse events between 1991 and 2010 [3], [4]. In some of these years, Niger experienced a 10-20 percent drop in underlying production trends, resulting in losses of more than US$100 million. Drought was the main cause of the most significant shocks, sometimes in combination with other events. The cumulative impact of successive shocks such as these can be devastating for an economy like Niger, where agriculture accounts for 40 percent of GDP [5], [6].

In addition to the impact on agricultural production, adverse events, particularly droughts, can affect foreign exchange earnings, reduce GDP growth and per capita income, lead to loss of government revenue, and require substantial financial resources for emergency response and recovery [3], [7]. The volatility of the national GDP growth rate and GDP per capita growth rate in Niger over a 26-year period (1984 - 2010) is evidence of this. A strong correlation can be observed between the decline in GDP growth rate and the occurrence of adverse events. The GDP growth rate was negative in 8 of the 26 years analyzed; in 6 of these years, the declines can be partially explained by drought events [8].

Other factors such as poverty, poor governance, demographic pressure, rapid and uncontrolled urbanization, conflict, and instability all contribute to increasing its vulnerability to the effects of disasters. Recurrent disasters lead to a continuing deterioration of livelihoods, expose populations to deep-seated poverty and food insecurity, and undermine their resilience to the shocks and stresses that occur. Although the country has made progress in disaster risk reduction (DRR), the focus is still on emergency response [9]. Post-disaster interventions are often characterized by a lack of coordination, short-term vision, and little involvement of the affected population.

Given the current international context, the whole world and Niger are facing immense challenges in terms of sustainable development. Billions of people continue to live in poverty and deprived of their dignity. Inequalities are increasing within and between countries. There are huge disparities in opportunities, wealth, and power. Gender inequality remains a major problem. Unemployment is a major concern, especially youth unemployment. Global health threats, increasingly frequent and intense natural disasters, the resurgence of conflict, terrorism, and related humanitarian crises, and forced population displacement threaten to reverse much of the development progress of recent decades. The depletion of natural resources and the adverse effects of environmental degradation, including desertification, drought, land degradation, scarcity of freshwater resources, and loss of biodiversity, have added to the list of challenges facing humanity today, making the situation even more difficult.

Climate change represents one of the greatest challenges of our time, and its impacts risk preventing countries like Niger from achieving sustainable development. At the end of the resolution (70/1) adopted by the General Assembly on 25 September 2015, UN member countries selected 17 sustainable development goals to address responses to these challenges [8]. At the national level, the National Strategy for Sustainable Development, and Inclusive Growth (SNDDCI) Niger 2035 and the Economic and Social Development Plan (PDES) are inspired by and aligned with these SDGs and set out the actions to be undertaken and the resources to be mobilized to achieve the sustainable development goals by 2030.

Regarding disaster risk reduction, UN member countries have adopted the Sendai Framework for Action [10], which sets four priorities for 2035: (i) understanding disaster risk, (ii) strengthening disaster risk governance to better manage it, (iii) investing in disaster risk reduction for resilience, and (iv) strengthening disaster preparedness to respond effectively and

"build back better" during the recovery and rehabilitation phase.

At the African region and at the national level, the Sendai Action Framework for Action has been translated into a regional strategy [11], [12], and at the national level, disaster risk reduction policies and strategies have been implemented with plans, tools, and specialized structures to create the conditions for a good disaster risk management and reduction framework.

However, despite the efforts made in Niger to build an adequate disaster risk management and reduction framework and to put in place structures and deploy tools in the field, the country is constantly faced with disasters, particularly those linked to floods, with their consequences in terms of loss of life, material goods, economic damage, and damage to the country's critical infrastructure. It, therefore, seems necessary to understand how the disaster risk management and reduction system works, through an analysis that would highlight its strengths and weaknesses, and to see how the use of geographical information to improve data collection methods can help to strengthen preventive action [1], [13] rather than emergency response, to move towards a more efficient approach to disaster risk management and reduction.

Methods

Research Method and Data Collection

Qualitative research is conducted using a methodological approach that involves collecting and analysing secondary and primary qualitative data to describe and understand the disaster risk management and reduction mechanisms in place and the tools used to make them work.

The data collection method used is semi-structured interviews with stakeholders and institutions involved in disaster risk management in Niger.

The scope of the qualitative research covered the following key points of disaster risk management and reduction:

1. **Framework, policies, strategies, and plans in place**: visions, objectives, main axes and principles of implementation.
2. **Specialized technical institutions, risk management bodies and tools**: A look at the types of institutions, their roles, and responsibilities,
3. **Early Warning Systems (EWS) in place**: EWSs are such an important system these days that it is useful to have robust and functional systems in place to provide early warning to vulnerable communities. Secondary data will be collected, and semi-structured interviews conducted. This should provide an understanding of the capacity to collect data, the types of data collected, and their quality and relevance.
4. **Disaster response and coordination**: How disaster response mechanisms are developed and strengthened at national, regional, and local levels. Frameworks for coordination, pre-positioning of emergency supplies, and training of actors in the event of an emergency,
5. **Climate change adaptation plan**: How are the long-term impacts of climate change, particularly on flooding, considered and how are climate change adaptation measures integrated into flood management strategies?
6. **Financing and risk transfer instruments**: What financing and insurance products and mechanisms are in place and how do they work to provide financial protection against flood-related losses?
7. **Post-disaster recovery and reconstruction**: Are there comprehensive plans for post-disaster recovery and reconstruction, with a focus on improved reconstruction and the integration of flood resilience measures into infrastructure and housing projects?

Interpretation and Report Writing

The SWOT (strengths, weaknesses, opportunities, and threats) analysis method was used essentially to highlight the key aspects of the results in terms of strengths and gaps to be covered to move toward an effective disaster risk management system.

Results

The field of risk and disaster management and reduction is very dynamic in Niger, in that numerous efforts are being made to align the country with international and regional frameworks and improve the national framework for risk and disaster management. To this end, several institutions have been set up and national policies, strategies, and plans adopted to support this area, given the country's level of exposure and vulnerability to multiple hazards. The results of the analysis presented below reflect the situation. They are presented on a case-by-case basis.

Framework, Policies, Strategies, and Plans in Place

The Sendai Framework for Action [10] is an international reference for Niger in terms of disaster risk management, and, as such, current strategies and plans are closely aligned with it. At the regional and subregional level, the African Regional Strategy for Disaster Risk Reduction [15], the ECOWAS Humanitarian Policy [12] and the Strategy of the Interstate Committee for Drought Control in the Sahel (CILSS), the FAO's Disaster Risk Management Strategy in West Africa and the Sahel [15], are also reference documents in terms of DRM alignment. At the national level, policy documents, strategies, and plans have been adopted in line with the framework established in the following. These include the National Strategy for Disaster Risk Reduction (NS-DRR), adopted in 2017 and revised in 2019, which is strongly aligned with the Sendai Framework's four priorities for action, namely (i) understanding disaster risk, (ii) strengthening disaster risk governance to better manage disaster risk, (iii) investing in disaster risk reduction for resilience, and (iv) strengthening disaster preparedness to respond effectively and "build back better" during the recovery, rehabilitation, and reconstruction phase. There is also the National Strategy for Sustainable Recovery (SNRD), technically adopted in 2019, whose vision is to ensure continuity between pre-disaster and post-disaster development planning, with the aim of filling existing development gaps and addressing new challenges arising from disasters. The National Humanitarian Action and Disaster Management Policy is one of the latest national-level documents to be adopted by the government in 2020. This policy considers the above national documents and is well-aligned with regional and international frameworks. Its vision looks ahead to 2035, with a view to responsible governance and effective, inclusive management of humanitarian action with a view to significantly reducing the impact of crises and disasters on people's lives and livelihoods, as well as on the country's socioeconomic infrastructure. The country also has a national climate change adaptation plan, adopted in 2022, which targets five priority sectors (health, livestock, forestry, transport, and wetlands), for which adaptation options have been proposed. Numerous other documents are also in place and complement the documents listed above.

Specialized Technical Institutions

In Niger, many institutions in place in Niger that play as varied as they are relevant in the field of risk management and disaster management and reduction. Key players are described below by the central, devolved, and local levels.

At central and regional levels, the key disaster risk management institutions are (i) the Ministry of Humanitarian Action and Disaster Management (MAH/GC), whose missions are essentially concerned with setting up humanitarian action and disaster management policies and strategies, as well as coordinating

the implementation of response and early recovery actions, (ii) the Ministry of the Interior and Decentralization (MI/D), which is responsible for civil protection, whose mission is to organize, coordinate and monitor disaster risk reduction activities, and (iii) the Ministry of the Interior and Decentralization (MI/D), which is responsible for civil protection, whose mission is to organize, coordinate, and monitor disaster risk reduction activities, and (iv) the Ministry of the Interior and Decentralization (MI/D), which is responsible for civil protection, whose mission is to organize, coordinate and monitor disaster risk reduction activities, (iii) the National Food Crisis Prevention and Management Mechanism (DNPGCA), created under the Prime Minister's Office by Order No. 00208/PM of 28 August 2012, which is one of the very first institutional disaster management mechanisms, but has undergone several changes, including the one currently in For its operation, it has several committees and units, including the early warning system coordination unit (CC/SAP), the food crisis unit (CCA), and the social safety nets unit (CFS). It also has regional and departmental branches. It should be noted, however, that some sectoral ministries have yet taken risk management into account. Responsibilities in this area do not yet seem to be clearly defined.

At the local authority level, vulnerability monitoring observatories (OSVs) have been established under the responsibility of the chairmen of municipal councils, and at the village level, community early warning and emergency response systems (SCAP/RU) have been established under the supervision of local authorities. These two bodies provide relevant support to the early warning system coordination unit at the local level.

Actors and Tools for Disaster Risk Management and Reduction

As far as the bodies in place are concerned, the most relevant are (i) the national platform for the reduction of risks and natural disasters, set up by Order N°0030/PM of 9 February 2012, whose mission is to promote the prevention and reduction of disaster risks at various levels, (ii) the operational centre for monitoring, alert and crisis management (COVACC), which is the interministerial crisis management tool and is dedicated to permanent monitoring and crisis management throughout the national territory. As far as tools are concerned, the ORSEC emergency organization plans, and safeguard plans are the crisis management and action tools currently being put in place by the National Civil Protection Service at the municipal level.

Early Warning Systems in Place

Niger is a pioneer in setting up early warning systems (EWS) in West Africa. An EWS has been in place since 1989, and the process has now culminated in the Early Warning System Coordination Unit (CC/SAP). This system focusses on early warning in food security and, since 2017, as a complement to the existing system, the Climate Risks and Early Warning System (CREWS) initiative has been used to build the capacity of technical services in early warning of sudden and dangerous hydrometeorological events. To achieve its mission, the EWS relies on various existing information systems, such as the Agricultural Market Information System (SIMA), the Livestock Market Information System (SIMB), the Crop Forecasting and Estimation Survey (EPER), and the Interdisciplinary Working Group (GTI). It is based on the target indicators for monitoring the situation, i.e., the rainfall situation, crop monitoring, the pastoral situation, secondary (non-agricultural) sources of income, the state of cereal, livestock, and consumer markets, the health and nutrition situation, warning signs, adjustment capacities, and the previous year's diagnosis (index). The process of monitoring food security, nutrition and disaster management situation is based on the targeting of vulnerable areas, vulnerable populations, and permanent monitoring of specific areas.

In terms of hydrometeorology, a recent diagnosis by the World Bank showed that the HYDROMET system is operational and can be used to concentrate and analyze data but needs to be modernized to make it denser and automate the data collection and information processing system. This has made it possible to set up a warning mechanism with appropriate tools for each structure, as shown in the table below.

Table 1. Structures, Tools, and Warning Products in Place

Structure	Tools/Products
Prime Minister	COVACC: steering
DMN	Database/Rain/Weather, Daily bulletins.
DHL/MHA	Database/Hydro, Bulletins
CC/SAP/DNPGCA	Notes on vulnerability, monitoring of sentinel sites.
DGPC/MI/D	Regular vigilance notes, ORSEC plan, regular data on flood impacts, etc.
DPAC/MAH/GC	Steering of SAP flooding, validation of impact datawww.risques-niger.ne

CREWS, Niger, 2022

Disaster Response and Coordination

An analysis of the institutions, tools, and frameworks in place certainly reveals the existence of an arsenal of consistent instruments for managing and reducing risks and disasters in Niger. Even if the issue of coordination seems complex and, therefore, difficult to pin down, there are relevant tools for responding to disaster crises. Each of these tools has an operating model governed by texts that are often contradictory [16]. In terms of emergency response, Niger has three key tools: (i) the support plan for vulnerable populations affected by crises, (ii) the common intervention funds which finance the support plan, and (iii) the national stock of reserves.

The support plan for vulnerable populations and/or populations affected by crises is the main reference framework for all interventions to prevent and manage food crises. It is the planning and programming tool for the interventions that DNPGCA and its partners implement to meet the needs of vulnerable populations identified using a participatory and inclusive approach. It includes the relevant activities for an appropriate response that contributes to the food and nutritional security of vulnerable populations and target groups. The common intervention fund and the national reserve stock are two emergency response tools provided for in a framework agreement between the State of Niger and donors to strengthen the implementation of the support plan.

Adapting to Climate Change

In 2022, the country adopted a national plan for adaptation to climate change, the vision of which is that, by 2035, Niger's socioeconomic development will be ensured by the establishment of (i) a climate resilient society and measures to reduce climate risks to communities and ecosystems, and (ii) the integration of adaptation to climate change into socio-economic development sectors and national policies. The overall objective of the NAP is to contribute to the sustainable development of the country by reducing the negative impacts of climate change. Specifically, this involves (i) reducing vulnerability to the impacts of a changing climate by strengthening the adaptive capacity and resilience of populations and natural ecosystems, and (ii) facilitating the integration of CCA into new and existing policies, programs, and activities and development planning and budgeting processes and strategies, in all sectors concerned and at various levels.

Risk Transfer and Financing

To date, there are few products in Niger in this field. According to documentary analyses and interviews with certain structure managers, two products have been announced: (i) the Pan-African Risk Management Mutual (ARC) of the African Union, of which Niger is a member and has an insurance company involved in the transfer of drought-related risks, and (ii) index-based agricultural insurance (AAI), which is currently being prepared.

Under the ARC-Insurance Company Limited, countries subscribe, and in the event of extreme drought events, the insurance company's disbursements are based on reaching thresholds defined by the country through customisation of the Africa Risk View software, which is the technical engine of ARC insurance and based on the severity of the rainfall deficit measured by the drought index in the countries. If the threshold is exceeded, insurance indemnities are theoretically paid out within 2 to 4 weeks of the end of the agricultural season. This is to enable the affected countries to start implementing the response before vulnerable populations start resorting to negative survival strategies. By combining traditional approaches to organizing relief and quantifying the damage caused by natural disasters with risk pooling and transfer, the ARC has been able to implement a drought response mechanism that covers the whole of the African continent.

Regarding index-based agricultural insurance, a committee was set up by Order No. 0058/PM of 18 March 2022 to oversee the process, including a diagnosis of the situation and the draughting of legislation governing the product. This work is underway with the support of the World Bank.

Post-disaster Recovery and Reconstruction

It is true that the Government of Niger has technically adopted a national strategy for sustainable recovery, but the funding mechanisms in place are not very relevant and/or not functional, according to a diagnostic analysis carried out to evaluate recovery funding instruments [17]. From this analysis, the tools used so far are projects and certain targeted recovery operations and a tool relating to the World Bank's Immediate Response mechanism, which is active at the request of the Government to rebuild damaged infrastructure and the resilience of societies shattered by the disasters that have occurred.

Discussions

Disaster Risk Management and reduction (DRM) encompasses a series of elements aimed at reducing the impact of disasters on communities and improving their resilience. An analysis of the mechanism in Niger reveals a proactive policy of setting up institutions and tools to ensure that the country has a good DRM framework. Strengths and weaknesses are identified and described in relation to the following key points: (i) policies, strategies, and governance; (ii) community participation and involvement; (iii) risk assessment; (iv) the early warning system; (v) disaster preparedness and response planning; (vi) infrastructure and physical protection measures; (vii) recovery and rehabilitation; and (viii) risk financing.

In terms of GRC policies and governance, the country has appropriate documents and governance structures at the central, devolved, and local levels. These include the establishment of the Ministry of Humanitarian Action and Disaster Management and a policy adopted to this end, the operational centre for crisis monitoring, analysis and management (COVACC), the warning code, etc. However, while these policies are well implemented with appropriate structures, the DRM framework seems to suffer from insufficient coordination and very limited appropriate resources to enable the framework to function properly. As far as community participation and participation are concerned, the framework in place in Niger has made great strides, due to the establishment at the local level of vulnerability monitoring

observatories and community early warning and emergency response systems. Even more recently, as part of the CREWS initiative, women leaders in disaster risk management have been targeted, trained, and organised, engaging both gender and the dynamics of disaster risk management and reduction at the local level. The major limit to this community's participation and commitment currently remains the functionality of the structures that have been set up, but also their generalisation to all the country's local authorities.

As far as early warning systems are concerned, while the framework put in place enables data to be collected for early warnings, it is still not edifying for the types of sudden-onset disasters that require rapid warnings, such as floods. However, it should be noted that a major advance has been made in this area because of the work carried out with CREWS resources, which has made it possible to improve the collection and automatic transmission of data for the instant generation of alert and warning information. This achievement needs to be strengthened by installing modern equipment and building the capacity of HYDROMET services to make the best use of it.

As far as risk assessment is concerned, some timidity has been noted, mainly due to the methods used, which appear to be inflexible and even cumbersome, requiring a great deal of resources that the country often struggles to mobilize. The use of new approaches based on geographical information using the standardized rainfall index, calculated based on proxy rainfall data collected at many sites [1], [13], will allow a major advance to be made in the identification, analysis, and assessment of the hazards, vulnerability, and exposure of communities or a region to different types of disaster. This will enable us to understand risks and their potential impacts, which is essential for effective disaster risk management planning.

In the area of disaster preparedness and response planning, the GRC framework in place in Niger benefits from important civil protection tools, governed by Law No. 2017-006 of 31 March 2017, determining the fundamental principles of the organization of civil protection and the warning code adopted in 2018, relief organization plans prepared and tested at the level of certain municipalities, and the start of establishing infrastructures to receive disaster victims. However, major efforts need to be made to improve the framework for anticipating and assessing the impact of disasters. In both cases, this will provide reliable data for better planning and/or more efficient responses.

Regarding the creation of protective and drainage infrastructure, it should be noted that there is unfortunately no formal program adopted by the public authorities in this area. However, the Government of Niger is increasingly adopting resilient infrastructure, population protection and drainage projects, both in urban areas and to protect production assets, particularly agricultural assets. The Disaster Risk Management and Urban Development Project implemented by the Government of Niger has built dikes to protect against flooding on the river at Niamey and on certain hydro-agricultural schemes, as well as drainage infrastructure in certain districts of Niger's main towns. It should be noted, therefore, that this area is not implemented based on a program, but rather in response to identified needs, especially following the occurrence of disasters.

In the field of recovery and rehabilitation, there is certainly a national strategy for sustainable recovery, which aims to ensure coherence in terms of pre- and post-disaster planning with long-term development objectives, but the framework for its application is not very clear in terms of coordination, even though it is clearly established that the field of drought and its impact on food security is the responsibility of the DNPGCA and that of floods is the responsibility of the MAH/GC. Each of these two institutions is working to implement a response plan, but the focus is much more on emergency response than recovery and

reconstruction. In the case of floods, a three-year flood response contingency plan was adopted in 2022 under the aegis of the MAH/GC, one of the specific objectives of which is to ensure the recovery of people affected by floods. In terms of food and nutritional security, the support plan for vulnerable people remains the main tool in a response that is still focused on emergencies rather than recovery and rehabilitation. The only major initiatives in recovery and rehabilitation after disaster events in Niger are still the two episodes of the immediate response mechanism activated in 2017 and 2020 after the floods that the country experienced.

The final point in this analysis is the funding question, for which the Niger government is facing a major shortfall. According to an estimate by the World Bank [3], Niger has an overall resource base of 126.72 million for crisis preparedness and response to crises, while the cost of drought-related food insecurity is around $100 million a year, and the cost of overall food security is 150 million a year. According to shock modelling [3], this combined humanitarian and economic financing gap is 768 million dollars for food production shocks that last 1 in 5 years and 1.1 billion dollars for food production shocks that last 1 in 10 years. This clearly demonstrates the limitations of the existing financing instruments, which are essentially made up of the common intervention fund, the national security stock, and the ARC insurance contribution. It is therefore essential to think about new financing instruments that are preferably geared toward recovery and rehabilitation.

Conclusion

This analysis shows that Niger has policies and strategies that are consistent with regional and global frameworks and instruments, in particular the Sendai Framework for Action on Disaster Risk Reduction 2015-2030. It also has functional institutions, notably the Ministry of Humanitarian Action and Disaster Management, the National Food Crisis Prevention and Management System, and the Directorate General of Civil Protection, all of which have tools and instruments for disaster risk management and reduction in Niger. There are also opportunities with support actors and development partners, in particular the World Bank, which provides Niger with disaster response financing tools, including the immediate response mechanism, which has been activated twice, in 2017 and 2020. The instruments in place and the legal framework may also enable the country to access the Catastrophe Differed Drawdown Option (Cat-DDO), another disaster financing tool of the World Bank Group.

However, despite this existing framework and the efforts that have been made, the country continues to face disaster crises that are often without precedent, as was the case with the floods of 2020, which caused damage and losses of around USD 800 million at the time, and the absence of a strategy for land use planning and the establishment of resilient infrastructures to prevent and reduce the impact of disasters, particularly floods.

To make the most of the country's assets and reverse the recurring trend towards disasters and their negative impacts, it is important to ensure greater consistency in the coordination of interventions. This can be achieved by setting up a strong high-level structure that can bring together all the players and give impetus to the mobilisation of resources. It is also important to place a strong emphasis on the development of operational tools that can lead to an even more sustained implementation of action plans, for which a strong emphasis should be placed on prevention rather than on the emergency response that seems to have been favored until now.

To reverse this trend, it is important to improve data collection methods by simplifying them using programmatic approaches that can provide the system with relevant and timely data to improve the early warning mechanism and allow the implementation of preventive actions

rather than emergency responses. Improving the country's disaster risk management and reduction framework will also require the implementation of coherent land use and urban development strategies, with appropriate building standards to build resilient infrastructures. But this can only be achieved through adequate funding mechanisms that can also ensure the mobilisation of private stakeholders.

Limitations

There are two major limitations to disaster risk management and reduction in Niger. These are access to quality data and the stabilization and capacity-building of the players involved in the existing system.

Conflict of Interest Statement

All authors declare that they have no conflicts of interest.

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Managing Corporate Reputation, Stakeholder Relations, and Corporate Social Responsibility Using Best Practice Public Relations Strategy: A Nigerian Perspective

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Abstract

Studies have proven that the reputation of any organisation is an aftermath of a robust relationship between that organisation and its stakeholders. The relationships that exist between these stakeholders are also on the grounds of the interrelationship existing between the organisation and its publics and the social behaviour of the organisation and the stakeholders who are also the publics of an organisation thereafter. For this reason, an organisations' reputation among its stakeholders is in accordance with the treatment the organisation gives its publics that translate into a corporate image and then to corporate reputation which on the whole informs the reputation the stakeholders would have later. The purpose of this paper is to identify the managerial role of managing corporate reputation, stakeholder relations, and corporate social responsibility of an organisation especially in Nigeria. The relationships that exist between these three key concepts; corporate reputation, stakeholder relations, and corporate social responsibility from a managerial perspective of corporate public relations strategies identifies and places organisations in the eyes of their publics as reputable. The study is relying on the postulation of the stakeholder theory which attempts to present a model that looks at who or what really is of essence. It hinges on the assumption that organisations, whether private or public, have an obligation to serve groups that constitutes into that organisation's publics.

Keywords: *Social Responsibility, Corporate Reputation, Corporate Stakeholders, Public Relations.*

Introduction

The term corporate reputation has evolved with the passage of time to become a strategic and intangible corporate asset the world over, and it has been used in the daily life, business life, and political life of people, governments, companies etc. from time immemorial. The reputation of an organisation matters to its survival and also explains why the organisation's customers/publics choose to have a cordial relationship with that organisation, love its product or service in preference to what competitors are offering. Reputation makes the difference between success and failure [1]. The rising and sophistication of stakeholders continued [1], in the globalised public relations and information technology world and in Nigeria, the changing business and competitive environments, the constant growing demand for corporate transparency and corporate social responsibility, organisation/stakeholder relationship etc. have encouraged the renaissance of caring and striving for good reputation from stakeholders.

In the analysis and findings of Maj [2] it is reveal that, ultimately in the management of corporate reputation, stakeholders relations and

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corporate social responsibility, the topmost thing an organisation must consider carefully is its internal communication mechanism and managerial capabilities especially its public relations strategies, because unless an organisation gains support of its internal publics first, it cannot manage its external activities leading to the management of corporate reputation and stakeholders successfully, which again has effects in the performance and profitability of the organisation. The internal publics of an organisation have to be kept involved and informed because they are the voices external publics (stakeholders) are most likely to hear and believe in and then invest in the company. In this regard, and to further give insight to this, [2] has postulated that, there is a number of stakeholder's typology that must be considered for attention in order to manage corporate reputation successfully, the first group according to [3], are the organisational stakeholders including employees of the organisation, its managers, and public relations units. The second group includes the economic stakeholders who are the customers, competitors, creditors, suppliers and distributors. The third group is the societal stakeholders who are Governments and regulators, communities, non-profits organisations, NGOs, and the traditional class.

The groups of stakeholders as posited above, from the internal stakeholders to the other two groups which are external to the organisation, function in a larger context to the social, demographical, technological trends, which influence the organisation and its reputation [2]. As a result, when an organisation is serious to communicate well, employee performance goes up, product quality increases, absenteeism decreases and so does the job turnover and organisation's stakeholders would invest more [4].

[2] have admitted that, apart from the fact that organisations should ordinarily deal reputably with publics, Corporate Social Responsibility (CSR) should in the first place be a set of activity that should be practiced by organisations in order to cope with publics, social and environmental problems. Organisations' corporate social responsibility is a practice that should be included as a part of the strategic preferences at the base of business organisation and should be aligned with all aspects of organisation's management including human resource, marketing, production, financial and more specifically the strategies of relating with organisation's stakeholders. Historically the ultimate objective of business organisation was to maximize wealth of its shareholders [6], and thus business organisations were seen as means of creating economic value for those who invest their capital in the business [6]. [7] have distinguished that,

The majority of the extant literature implies that stakeholders are managed by the whole organization, rather than by a specific group of managers. But since (typically) it is the Top Management Team that crafts an organization's strategy, it therefore also needs to attend to the strategic management of stakeholders if it wants to ensure the strategy's robustness. By anticipating and managing stakeholder responses to organizational strategies, actions can be put in place that either capitalise on potential positive responses or reduce or eradicate negative responses.

According to [2], stakeholders of any organization are the key to a successful implementation of organization's projects, policies, or strategies. Due to the constantly increasing involvement of stakeholders into the functioning of the organization, and the increasing interdependence within organizations as well as in its environment, it becomes essential for its functioning and the competitiveness of an enterprise to identify the different stakeholder groups and adapt the management style appropriate to every group.

Clarification of Concepts

The following concepts were critically examined, Corporate Social Responsibility,

Corporate Stakeholders, Corporate Reputation, Public Relations Strategies,

Corporate Social Responsibility

Corporate Social Responsibility otherwise CSR can be conceptualized as an ongoing commitment by business organizations to play their role in economic development of the society, improving quality of life of workforce and their families as well as the society and community at large. According to [5] argued that CSR has been considered as a source of sustainable development and has become an emerging imperative. So, in order to achieve business objectives, organizations should look at the environmental and social impacts of their business processes as well as their products. Addressing the interests of direct stakeholders should not be the only priority of the businesses but they must also indirect stakeholders. In essence, CSR is a set of activities that is deliberately practiced by organisations in order to manage social and environmental problems of it communities. Corporate social responsibility is a practice that should be included as a part of the managerial strategic preferences at the base of business organisation and should be aligned with all aspects of organisation's management including human resource, marketing, production, financial and more specifically the strategies of business. Historically the ultimate objective of business organisation was to maximize wealth of its shareholders, and thus business organizations were seen as means of creating economic value for those who invest their capital in the business.

Corporate Stakeholders

The study [8] said that any group or individual who can affect or is affected by the achievement of an organization's objectives are stakeholders. They argued that corporate stakeholders are usually defined by two distinctions; the first distinction is those stakeholders who have the power to directly affect the future of any organisation. The other distinction is the class of stakeholders who are formally powerless to affect the future of organisations.

A study [3] has acknowledged that, there is a number of stakeholder's typology. The first group, according to [3] organisational stakeholders include employees of an organisation, its managers and stakeholder units. The second group includes the economic stakeholders, customers, competitors, creditors of, suppliers and distributors. The third group is the societal stakeholders who are Governments and regulators, communities, non-profits, NGO's and the environment. The first group of stakeholders is internal to the organization while the other two groups are external. The group of economic stakeholders is a link between the organization and the societal stakeholders. The three groups of stakeholder's function in a larger context of social, demographical, technological trends, which influence the organization but also all of its stakeholders [3].

Corporate Reputation

According to [1], Corporate Reputation directly affect the strategic behaviour patterns of a firm and the observable characteristics of the manner in which an organization performs decision-making and planning function with regard to issues that are of strategic importance to its survival; that it is a directly related to the corporate identity of that organization and it is interpreted as the organization's ethos, goals and values that create a sense of belonging among organization's stakeholders, it hinges upon the perception build earlier by the organization and acknowledged by publics of the organization from past actions and future behaviour, and viewed not in isolation but in the context of what others are doing in the marketplace. [1] pointed that this is important for organizations, for if all the organizations close to you are reputed for charity, but you don't, and then by this singular act of not doing which is a result of poor PR, your organization may also be seen as mean-spirited. For instance, a company that is reputed for bad labour relations can decide to the use of

Human Resource management policy to address this, though it may take time for that company to get a reputation as a good employer, because so much of its reputation depends on past its past performance. Reputation is a perception of character. For a person or place it is what you expect them to be like based on what you know of them. For a business or organization this character is also a reflection of behaviour, what it has done in certain situations and can be expected to do in future occasions. [1] has postulated that:

Reputation is a word much used today as a perception of past actions and future behaviour of an individual or organization viewed not in isolation but in the context of what others are doing in the marketplace. This relativity is important and a good one is earned through hard work yet can be quickly lost through misfortune or incompetence. Apart from the dynamics of reputation, the quality depends on the relative values of the sector or its stakeholders. A bank might be judged to have a good reputation on service quality, but deposit security is likewise a business-critical success factor.

In the contemporary corporate world, corporate reputation is considered a major determinant of an organization's provenance and continual survival financial prowess as well as performance and acceptability. It is a "collective representation of multiple constituencies" images of a company built up over time. It is also linked to the organization's identity; performance and the way others respond to its behaviour[1]. [9] in the light of the foregoing acknowledged that:

Within the past several years, business environment has witnessed a rapid pace of globalization, becoming more dynamic and competitive. Increasing market pressure, the shift in requirements and rise of sophistication of different stakeholder groups have determined companies to actively search for drivers that will support their efforts in achieving sustainable competitive advantages and positively differentiate in the context of a fast-changing business world.

In respect to financial, economic and organizational benefits of any organization, prompted by corporate reputation, increased attention of organizations has been drowning to a better understanding of the importance of this intangible asset, corporate Reputation. Bearing in mind the pivotal role it has in generating value for the company that manages it with extreme attention[9].

Public Relations Strategies

Public relations that form of communication which aims at generating and sustaining goodwill and mutual understanding between an organization and its publics. It is a planned communication, it concerns every organisation, whether commercial or non-commercial, and government. Basically, since every organisation needs to create a favourable image for itself before its internal and external publics for successful operations, the place of and handling of public relations as a vital communication tool in the hands of all organisations in all modern societies cannot be overemphasised. Public relations are that management function in organisations, which helps in establishing a favourable relationship between the organisation and its publics, this is not a quick fix mechanism though, it demands concerted, consistent and complementary efforts over a long period for the strategies and programs to have maximum effects [10].

According to [10] the following are some of the strategies public relations department can employ successfully, Mass reorientation, Rebranding, Effective use of Advertising, Crisis Communication Management, Advertising in International Media, Film and Documentary Film Production, Sponsorship of Literary Works, Sponsorship of Sporting Activities, Effective Media Relations, Effective Community Relations Application, Use of Conference Centres, Periodic Organisation of Press Conference, Organising Seminars,

Organising Trade Fairs, Establishment of Cultural Centres.

Theoretical Underpinning

An author study [11] has concluded that the stakeholder theory attempts to present a model that looks at who or what really is of essence. That the stakeholder theory hinges on the assumption that organisations, whether they are private or public, has an obligation to serve groups that constitutes into that organisation's publics. These publics are now referred to as 'stakeholders', they are those that influence the survival and the daily activities of the organisation and are they too influenced by the actions of the organisational. In the words of [11]:

We next present the three aspects of stakeholder theory—descriptive/empirical, instrumental, and normative— found in the literature and clarify the critical differences among them. We then raise the issue of justification: Why would anyone accept the stakeholder theory over alternative conceptions of the corporation? In subsequent sections, we present and evaluate the underlying evidence and arguments justifying the theory from the perspective of descriptive, instrumental, and normative justifications. We conclude that the three approaches to stakeholder theory, although quite different, are mutually supportive and that the normative base serves as the critical underpinning for the theory in all its forms.

In the attempt to analyse the above postulation [11] vividly posited that the 'stakeholder theory' is unarguably **descriptive in its natural sense.** That **i**t presents itself as a model describing what a corporation is. It also describes the corporation as a constellation of cooperative and competitive interests possessing intrinsic value. And aspects of the model may be tested for a descriptive accuracy. As well as serve as a framework for testing any empirical claims, including instrumental predictions, relevant to the stakeholder concept (but not for testing the concept's normative base). The stakeholder theory is also **instrumental** Donaldson continued**.** Meanwhile, the principal focus of interest here has been the proposition that corporations practicing stakeholder management will, other things being equal, be relatively successful in conventional performance terms (profitability, stability, growth, etc.). Significantly according to Donaldson, the fundamental basis of the theory is normative and involves the acceptance of the following ideas: (a) Stakeholders are persons or group of persons with legitimate interests in procedural and/or substantive aspects of corporate activity. Stakeholders are identified by **their** interests in the corporation, whether the corporation has any corresponding functional interest in **them.** (b) The interests of all stakeholders are of **intrinsic value.** That is, each group of stakeholder's merits consideration for its own sake and not merely because of its ability to further the interests of some other group, such as the shareowners.

On the overall, [11] conclusively posited that the stakeholder theory is **managerial** in the broad sense of them term. It does not simply describe existing situations or predict their cause effect relationships: it also recommends attitudes, structures, and practices that, taken together constitute corporate stakeholder management. [11] sums that stakeholder management on the other hand requires,

as its key attribute, simultaneous attention to the legitimate interests of all appropriate stakeholders, both in the establishment of organizational structures and general policies and in case-by-case decision making. This requirement holds for anyone managing or affecting corporate policies, including not only professional managers, but shareowners, the government, and others. Stakeholder theory does not necessarily presume that managers are the only rightful locus of corporate control and governance. Nor does the requirement of simultaneous attention to stakeholder interests resolve the long-standing problem of identifying stakeholders and evaluating their legitimate

"stakes" in the corporation. The theory does not imply that all stakeholders (however they may be identified) should be equally involved in all processes and decisions.

The study [12] contributed on the discourse of Stakeholder theory and wrote,

Stakeholder theory is managerial in that it reflects and directs how managers operate rather than primarily addressing management theorists and economists. The focus of stakeholder theory is articulated in two core questions. First, it asks, what is the purpose of the firm? This encourages managers to articulate the shared sense of the value they create, and what brings its core stakeholders together. This propels the firm forward and allows it to generate outstanding performance, determined both in terms of its purpose and marketplace financial metrics. Second, stakeholder theory asks, what responsibility does management have to stakeholders? This pushes managers to articulate how they want to do business—specifically, what kinds of relationships they want and need to create with their stakeholders to deliver on their purpose.

Identifying Organisation's Stakeholders and Their Relevance

[13] have claimed that there Primary and Secondary stakeholders. The Primary stakeholders are those they agreed are those the company cannot survive without, they include shareholders, employees, customers, and suppliers' others include public stakeholders like the governments and government agencies, the immediate communities that provide infrastructures and distances security, and whose mores and values the organisation must obeyed.

Secondary stakeholders [13] include those that affect or are affected by the organisation, but do not transact in whatever kind of business with the corporation and cannot essentially be a priority for its survival, such as media and other interest groups. Secondary stakeholders have the ability to influence the public opinion and in turn influence the company in a positive or negative way, but the organization would not depend on them as in the case for the primary stakeholders. [13] added that the demand of any organization from its primary stakeholders can be satisfying in several different ways and to different measures, which influences organizations to adopt a more reactive or proactive management strategy. [13] maintained that the type of stakeholders an organization is dealing with is important in order to pursue credible achievements as the stakeholders have the ability of allocating substantial resources in multiple domains. Therefore, there lies a great challenge for organization in addressing the concerns of key stakeholders in an effective manner as they have different interests and demands that needs to be satisfied.

While distinguishing the various influences of stakeholders, in 2011, Lindblom and Ohlson, itemized and quantified their various influences thus.

Employees

Being an organisation's primary stakeholders, employees are stakeholder that affects or are affected by an organisation in one way or another. Employees are according to [14] says [13] a big reason for an organisation's success in terms of support the environmental goals (i.e social responsibility), of the organization. [13] also claimed that employees can promote an organisation's capacity by implementing managerial and organizational goals/targets.

Shareholders

According to [13], "Shareholders are important for companies. They serve as investors and risk money due to the company's operations. Poor environmental performance can lead to environmental damage, which in turn can result in monetary losses for the shareholders." in the light of the foregoing, shareholders stand as great assets and influence on an organisation as they can withdraw capital or refuse loans. [13] Posited that the perceived importance of shareholders and their pressure depend on

whether the company is family-owned or on the stock exchange. As a result, shareholders can influence the organisation's social responsibility by expressing their concerns.

Henriques and Sadorsky (1996, p. 384) cited in [13] argued that the pressures from shareholders arise as a result of **"(1) discontent with environmental fines which lower profits, (2) disillusionment with progress toward environmental goals and (3) difficulties in raising new capital or attracting new investors"**. To prevent or reduce this from happening it is important to communicate with the shareholders and to make them aware of the firm's environmental position. The more pressure the shareholders put on the firm, the more likely is it that the firm will develop an environmental strategy.

Society

It is discussed by Fraj-Andrés et al. (2009) quoted by [13] that organisations act towards social values in the societies to achieve a social image and creates an impressive Social responsibilities projects that would lead the organisation to undertake a transparency and an openness of their performance.

Stakeholders' Responsibilities and Interests to an Organisation

Every success an organization's stakeholder attains to is built on the foundation of good working relationships with its organisation. These relationships foster trust and open communication, which are essential for good PR practice as they are key aspects of profit growth for the organization. The responsibility of stakeholder and the importance they have to organisations revealed that it is profitable for organisations to maintain cordial relationships with stakeholders for one main reason reputation, which is necessary for the survival of any organisation. The dependency of the organisation on the stakeholders being responsive and responsible to the organisation enables the relationship between stakeholders and organisation to strife to success which is also vital to the organisations and their inaction may place its survival in jeopardy [8].

It can be concluded that stakeholders have an indirect impact on corporate reputation through the stakeholder relationship with the organization. In part, stakeholders unconsciously form corporate reputation. On the other hand, the organization must try to maintain the relationships, to satisfy the stakeholder expectations, to coordinate the performance and to consider the stakeholder interests. Organization also should be able to fulfil stakeholder requirements primarily due to the fact that the stakeholders, realizing that they do not receive a sufficient benefit from organization, can easily choose cooperation with another organization.

Overview of Managing Corporate Reputation and Building Sustainable Stakeholder Relationship and Providing Socially Responsible Relationship

In the events of today's severe competitive markets, with differentiation between organisations in terms of their pricing, product and/or service qualities and the value of delivery system, the need for organisations to create a niche for themselves and their stakeholders cannot be overemphasized. Thus, positioning the organization inside the customers' black box, (i.e., customers' memory) through communication channels such as advertising promotion, publicity, public relations, marketing, annual and regular meetings, staff welfare and promotion, branding and its sustainability becomes the obvious [15]. Managing corporate reputation and building a sustainable stakeholder relation, continued [15] are likely to play only a secondary role in customers' choice decisions especially when these competing services as mentioned earlier are perceived by the organisation's publics as practically identical to the organisation's performance. In essence, corporate image which is akin to corporate reputation is considered an

asset which gives the organisation a chance to differentiate itself in the area of service provision and aiming to maximize their market share, profits, attracting new customers, retaining existing ones, neutralizing the competitors' actions and above all their success and survival in the market, [15]:

Stated that corporate image consisted of two main components; the first is functional such as the tangible characteristics that can be measured and evaluated easily. The second is emotional such as feelings, attitudes, and beliefs the one has towards the organization. These emotional components are consequences from accumulative experiences the customer have with the passage of time with the organization.

Managing corporate reputation and building a sustainable stakeholder relationship and providing socially responsible relationship is conceptualised as the "overall impression" created in the minds of company staff and customers as a result of an accumulative feelings, ideas, attitudes and experiences with the organization activities and services, that is stored in memory, transformed into a positive meaning, that can be retrieved to reconstruct an impressive image/picture of quality, commitment and satisfaction especially when the name of the organization is heard or brought to ones' mind. Thus, this singular target is a result of deliberate communication process in which the organisation creates and spread specific impression that constitutes their strategic intent; mission, vision, goals, and identity that reflects their core values that they cherish and wish to use to guarantee a sustainable stakeholder relationship [15].

Literature Review

Corporate reputation which is a bye product of a corporate image is a strategic category of modern business says [16]. For reputation to become a factor for stakeholder relations and corporate social responsibility and profit excellence, corporate image has to be of a good quality, i.e., it has to be positive, stable, clear, viable and able to impact on the publics of an organisation who are also the shareholders and stakeholders of the organisation. In this regard, the positive way for creating and keeping a corporate image that is beneficial for corporate reputation management is a strategic approach. And according to [16] the strategic approach to be employed is the type employed by the public relations practitioner in building relationship that is the very part of a strategy (Corporate Communication) that is needed to be employed. In fact, besides all aspects of communication activities (management communication, marketing communication and different concepts of organisation communications), PR strategy has the greatest influence on companies' image toward building corporate reputation. [16] pointed that public relations strategy is absolute because,

It is clearly needed to continuously signify to managers that this strategy leads to positive image. Also, they must know that positive image represents an important parameter of business efficiency, and that it has the power of initiating profitable growth and development of…companies. A strategically developed positive image can improve the company's reputation, lead to bigger affection of internal and important external publicity, increase recognisability of the company in the market, enhance competitiveness and employment and lead to many other communication and business benefits.

Meanwhile, [16] continued that it needs to be taken into account that the image of a company is a cumulative result of all the company's "real" activities (for instance banking in the case of a financial institution) and all its communication channels (that's through which it relates desired messages to relevant groups of publics). Therefore, all the business activities that an organisation is involve in should reflect through their corporate image. All the things that the organisation does (or doesn`t do), all their social support programmes, assistance, and what they do in the context of their regular business

activities often are faster and more influential than what is presented to the public using some special designed communication. This then is the reason and source of corporate reputation.

[17] have articulated that Corporate Reputation is a direct effect of the strategic behaviour pattern of a firm and the observable characteristics of the manner in which an organisation performs its activities and planning function with regard to issues that are of strategic importance to its survival, growth, and profitability. Corporate reputation is directly related to the corporate identity of an organisation which is also evident in the productivity and quality of the organisation's staff, and it is interpreted as an organisation's ethos, goals and values that create a sense of belonging among company's stakeholders [17].

The scholars further posited that obviously corporate reputation has long been recognised as a critical success factor in marketing a service, that a good reputation is considered an asset that can enhance buyer's expectation regarding the company's offerings. The reputation of an organisation enhances its communication effectiveness, in the areas of [1] pricing and advertising which serve as communicator of product quality. In their desire to attend to the height of business glory, an organisation according to [18] must recognised that,

The quest for being an exclusive, best, and responsive company indicates necessity for acknowledging corporate reputation to be an important source of competitive advantage. Good corporate reputations are critical not only because of their potential for value creation, but also because their intangible character makes replication by competing firms considerably more difficult. Thus, corporate reputation can be a key contributor to an organization's success, and it can just as easily be a contributing factor to an organization's failure.

These scholars added to this discourse that, in a society such as the 21st century Nigerian society where markets are saturated with competing products and services, and where consumers continue to grow in influence, corporate reputation has become a crucial consideration for organisations. Thus, the usual rules and laws place by institutions are no longer enough for assuring efficient exchange of goods and services; hence reputation and its outcome, and overall, trust plays critical role. Today reputation plays a substitute role for deficient information about a company in Nigeria, products, services, and practices do not matter; since governments have not woken up to their responsibilities but left it in the hands of the publics of these organisations [18]. Although a company's reputation may be harmed by adversity, it may emerge from the episode with its reputation enhanced – simply by applying public relations strategies. On the other hand, an organization can squander golden opportunities for building bad reputation through inept management. Added to such challenges is the fact that there are no hiding places anymore. The internet, blogs and mobile technology have made it possible for anyone to broadcast information to large audiences in a very short space of time [18].

In their concluding position, [18] suggested that the solutions to reputational challenges start with a new management mind-set and decision. That, companies must deliberately engage in the world that surrounds them rather than try to manipulate the world through contrived communications. They must do this in a carefully, structured, and in an intentional way. When the company/organisation becomes part of the dialogue about its activities through public awareness campaigns, product, and services rather than it taking to external manipulation, it will create for itself an opportunity to influence the terms and vocabulary the world uses to discuss its affairs. [18] said:

This convergence usually creates cooperative relationships with those external groups (investors, special interest activists, the press, and the community) in whose minds the reputation of the company forms, and who therefore exert a profound influence on its long-

term sustainability. Organizations need to enhance their listening skills so that they are sufficiently aware of emerging issues; to reinvigorate their understanding of, and relationships with, critical stakeholders; and to go beyond traditional public relation (PR) by activating a network of supporters who can influence key constituencies, doing so effectively means stepping up both sophistication and the internal coordination of reputation efforts.

An organisation's ability to maintain a sense of acceptable conduct in the heat of the competitive marketplace is attainable only through true engagement with its constituencies. The constant receiving of feedback from outside is the best protection against management's excesses to a robust and mutual management of stakeholders. And the first step in creating such engagement is an active institutional listening capacity [18].

An examination of the above literature of corporate reputation has led to the rise of stakeholder management in a complex market environment. Today's corporations have paid substantial attention to these three key concepts which this study focuses on, i.e., corporate reputation (CR), stakeholder relations (SR) and corporate social responsibility (CSR). The impact of SR is build and managed on corporate reputation and also is shaped by how an organisation manage and communicates its CSR activities to its external stakeholders; how the organisation's activities are reported in the national media and other communication mediums, determined consumers patronage and loyalty; responsible organizations that have good reputation who constantly execute series of programmes that have social responsibility statues, certainly gives big impact to their corporate reputation among their various publics. A good reputation influences a positive consumer satisfaction. In addition, companies use CSR communication to enhance customer loyalty [19].

[19] found also in their study that stakeholders are "those people and groups that affect, or can be affected by an organization's decision, policies, and operation". Their research indicated also that organisation's success in stakeholder relations depends on how it is able to manage its relationship with key stakeholder groups, such as customers, employees, suppliers, communities, politicians, landowners, and others. Similarly, Werther and Chandler (2006) quoted by [19] admitted:

that the stakeholder relationship occurs as a consequence of business activities and such groups might be local communities, the media, business support groups, state and local government, social activist groups and so forth. To ensure the organisation's success, the company have (sic) "to keep the support of all of these groups, balancing their interest, make the organizations a place where stakeholder interests can be maximized over time.

The duo of Abdullah and Aziz unequivocally mentioned that with the increasingly global nature of business and the rapid technology-based flow of information in the developed and emerging markets, corporate social responsibility have come to the forefront of business concern in the efforts to manage stakeholder relationship. Moreover, this relationship is built on the premise of how these firms deal with social and environmental issue, they [19] premised their postulation on corporate social responsibility movement as the rudiment of stakeholder relation, because corporations are the dominant institution of societies and must squarely face and address the social and environmental problems that afflict mankind. [19] continued that from a stakeholder management perspective, CSR is "the management of stakeholder's concern for responsible acts related to environmental, ethical and social phenomena in a way that creates corporate benefit", that CSR communication aims to provide information that legitimises an organization's behaviour by trying to influence stakeholders' and society's image of the company. [19] disclosed that the hard evidence collected from their study revealed that four key

themes pertaining to stakeholder relations are as follows:

1. Stakeholder engagement,
2. Maximizing stakeholder values,
3. Coherent system or policy on stakeholder relations, and
4. Fair and equitable treatment of employees.

They said, all groups ranging from Multinational Corporations (MNCs), Government Linked Corporations (GLCs) and Local Private Companies (LPCs) significantly agreed that stakeholder relation is vital for business success. As far as stakeholder relation is concerned, building a favourable relationship with stakeholders requires the top management personnel to seriously pay attention to the basic virtue of humanity that is honesty as through honesty, fair dealing, and transparent reporting we build and cultivate a favourable relationship with our stakeholders. [19] were with the opinion that:

it is important for today's organisations to listen and meet stakeholders' demands to stay focused and grow steadily in the competitive business environment as…engaging with a specific stakeholder such as media requires a brilliant approach to treating them very well and showing them the real value of organisational capability…Keeping stakeholder engagement in mind, maximizing stakeholder values is vital for today's corporations which attracts real benefits and rewards to improve its performance and reputation…The consensus is that by having a coherent system or policy on stakeholder relations keeps the organization in mind the importance of managing their internal and external stakeholders constantly.

The Duo concluded on this discourse that indeed, corporate reputation hinges on the image building through the activities of Public Relation professional, corporate reputation is a tangible asset that can bring a corporation to the top of the global and corporate world. [19] emphasised that corporate reputation is what organisations need to earn from various stakeholder groups the relationship that would guarantee the provision of social responsibility projects. Managing internal and external stakeholder groups according to the scholars is vital in allowing organisations remain visible, transparent and distinctive among their top competitors in the corporate world and in Nigeria. Stakeholder relations have the highest stakes in top priority of corporate performance. They [19] argued that "Different stakeholders require different demands and needs. The challenge here for today's corporations is not only to meet and satisfy all stakeholder groups' needs but also get them involved directly in its relevant business activities." These two areas of corporate reputation and stakeholder relations cannot be managed by any corporate organisation without first considering the value of CSR.

Research Methodology

The study was directed at managing corporate reputation, stakeholder relations and corporate social responsibility using public relations strategy: a Nigerian perspective, it was organised under research deign, in the quantitative techniques. The secondary research methodology was adopted for this research which involves the analysis of pre-existing literary works done by various scholars and also from various internet websites as touching the topic under study.

Result and Discussion

In an increasing today's highly competitive market environment, managerial skills, and differentiation in the handling of reputation, stakeholders, corporate social responsibility has become key factor between organisations in areas of price, products, or service characteristics of the value of delivery system. The positioning of organisation inside the customers' black box, i.e., customers' mind through communication channels such as advertising, branding, banner ads, billboards ads, public relations strategies etc., goes a long way in determining all forms of relations that the organisation would enter into [15].

The heightened interests in the role of corporations in the provision of corporate social responsibility (CSR) in communities have been promoted by increased sensitivity to the awareness of environmental and ethical provisions. It means these communities have become increasingly concerned that greater influence and progress by organisations have not been accompanied by commensurate efforts and desire in addressing important social issues including problems of poverty, poor education infrastructure, and provision of potable drinking water, crime prevention, and environmental pollution in Nigeria. It is therefore very essential to realise that public outcry for increased social responsibility will not disappear if business organisations fail to respond to the challenges these had posed for the society [20].

The 2012, postulation by Adeyanju also mentioned that:

Some ten year ago, what characterized the Nigerian society was fragrant pollution of the air, of the water and of the environment. Most corporate organizations are concerned about what they can take out of the society and de-emphasized the need to give back to the society [their host communities]. This attitude often renders the entire community uninhabitable. A case in mind is the Niger Delta area of Nigeria. This translated to negative integrity and reputation on the part of corporate identity as people perceived this as exploitation and greed for profitability and wealth maximization within a decaying economy of Nigeria. However, the general belief is that both business and society gain when firms actively strive to be socially responsible.

There are many reasons for this gain according to the study of [20]. Firstly, the study points to the socio-economic needs of the societies like in Nigeria where these companies operate, it thinks that the organisation's needs are been met by the communities' abundant natural resources, that the companies must realise they cannot succeed in societies that fails. Secondly, many Nigerian societies for example have become dependent on government projects so there is an ingrained culture of government presence in Nigeria, organisations can cash on this and provide as much as they can. A third reason is that CSR is still at an early stage in Nigeria, and most of the societies do not understand their roles, as soon as they embark on the provisions of socially responsible projects the better their reputation's has gone far beyond the old rhetoric of philanthropy as in the past where donating money to good causes at the end of the financial year of organisations was admitted as CSR, but an all year round responsibility that companies accept the environment around them for the best working practices, for their engagement with their local communities and for their recognition that brand names depends not only on quality, price and uniqueness but on how cumulatively they interact with companies work force community and environment [20].

Building/Managing corporate reputation, stakeholders and social responsibility in today's Nigeria has therefore become more important than it has ever been. This is due to many factors such as: increased public awareness about organisation's activities (gains), their social responsibilities ethics, corporate image/reputation, increased requirement for transparency, higher expectations by multiple stakeholder groups, word-of-mouth and online communication, customer's personal experience with a company's products and services, effect of the influence of opinion leaders, growth in interest groups and increased attention from media organisations. It was in the past when, companies would apply a passive approach to managing corporate reputation. In those days these companies would form task forces to handle crisis sometimes through dialogue with the aggrieved communities in order to minimize its negative effects on the organisation stakeholder and go back to normal business. In the meantime, nothing is done to actively manage the agitation of the host communities and the organisation's bad reputation on the long

term [21]. This reactionary strategy says [21] cannot be applied today due to the growth in technology and the continued increase in the knowledge base of the publics. Companies are now more vulnerable to their existence and sustenance so long as they do not actively and proactively seek to manage their reputations. Organisations have to manage their reputations deliberately and actively and not merely react when they are faced with crisis.

Suggestions/Conclusion

1. Organisations must be consistent in applying public relations strategies in managing corporate image/reputation, stakeholder relations and corporate responsibility, especially in the area of research.
2. Since there is a positive relationship between corporate image and reputation, stakeholders and corporate social responsibility and overall service quality, stakeholder satisfaction and customer loyalty as indicated in both relationships must be highly protected.
3. Obviously, a good reputation is a reflection of an organisation's strategic management abilities, goals, and directions, so if these matters are in good order, it gives stakeholders and publics a good impression; and impression is what reputation is all about. And since people do not make decisions rationally but more based on emotions, thus having a good reputation is the best way for an organisation to ensure that the customer chooses their products/services over a competitor's. The more attractive the organisation is perceived the more probable is their economic success, social acceptability, and cordial relationships.

Competition on the global and local markets is harder than it has ever been. Managing Corporate responsibility is now emphasised in media and in public squares, among youths and adults too and in marketplaces. Corporate strategies in managing reputation, stakeholders and social responsibilities cannot be downsized any more. For these reasons reputation has become a new meter for an organisation's success, acceptability, and a way to increase competitive advantage. It has been established here that reputation consists of people's opinions and perception, the good thing about it is that it can be created through competent corporate public relation strategies. The reality is that good reputation increases an organisation's profitability and interest among stakeholders, employees, investors, and even analytics can have an impact on how the company's reputation is seen as a whole. Building a reputation can be a long and complicated process, but to break it down only takes, for example, few dissatisfied and loud enough employees.

Conflict of Interest

The author declares no conflict of interest.

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Standardized Precipitation Index (SPI)-Based Flood and Drought Hotspot Mapping in Niger, West Africa

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Abstract

Niger is a Sahelian territory in West Africa, with a surface area of 1,267,000 km². Most of it is desert, sparsely populated, or uninhabitable, with a low population density of around 18 inhabitants per km². The adverse effects of climate change and the frequency and intensity of natural disasters are increasing, while the country is evolving in a context characterised by a lack of and/or limited access to detailed, reliable, and up-to-date data, useful for better risk and disaster management. The methodological approach was based on the use of the agroecological map of Niger offering four main zones (Sudanian, agropastoral, pastoral and desert), the calculation and projection on this map of the Standardized Precipitation Index (SPI) of 3935 localities based on the rainfall proxy data series (1979-2035), and then the identification of zones impacted by extreme climatic events. The populations impacted in these identified areas are estimated by projecting onto these areas the updated population of more than 36,000 georeferenced localities in ReNaLoc. The result of this approach shows that it is possible to opportunely identify zones and collect key data for use in the disaster risk management process in the context of a country where data is difficult to acquire.

Keyword: *Floods, Droughts, SPI, Extreme event, Risk Management Parameter, Characterisation, Impact, Niger.*

Introduction

Niger is a vast, landlocked country in the arid Sahel region of West Africa, covering an area of 1,267,000 km². Most of its territory is desert, sparsely populated, or uninhabitable, with a low population density of about 18 inhabitants per km² [1]. As a result of climate change, the frequency and intensity of natural disasters have increased [2-4].

Therefore, the country is faced with extreme events that often cause natural disasters, the impact of which is exacerbated by the vulnerability and exposure of the population. Drought, recurrent flooding since 2000, and locust invasion are the main hazards, factors, and causes of the catastrophic events observed in the country. So much so that during the same wet season, rare rainfall events can unexpectedly cause flooding, resulting in major damage in some localities, while in others, long dry spells can affect agricultural production, resulting in major food shortages [5, 6].

Between 1986 and 2020, some 56 disasters were reported in Niger. Most of these were droughts, floods, and epidemics, causing 10,384 deaths and affecting 28.2 million people [6-10]. Droughts accounted for 89% of the population affected by disasters, while epidemics were responsible for the majority (94%) of deaths in the country [1].

However, although they affect a small proportion of the population and are less deadly,

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floods have been a major threat to Niger in recent years. The human and economic consequences of flooding have been considerable and could be even greater in the future.

Although economic impact data are not readily available for all past floods, negative impacts on populations, housing, and the agricultural sector have increased significantly since 1998 and are exacerbated by practices such as unauthorized construction in flood-prone areas and near water points, and/or the dumping of solid waste in primary, secondary, and tertiary drainage infrastructure networks [8, 11-13].

The climatic shocks recorded in Niger also have exacerbating effects on poverty. According to surveys conducted in 2011 and 2014, households identified drought and floods as the main cause of widespread poverty (33%), while households experiencing income shocks due to drought or floods are 4 percentage points less likely to see their children attend school [8].

Thus, the country regularly faces disaster crises in a context characterized by (i) either a lack of detailed, reliable, and up-to-date data on food security, nutrition, vulnerability, and the standard mechanisms used to adapt to shocks or (ii) limited access to some of these data remains a challenge [10], [14].

This is a major constraint, leading to a lack of relevant data, which hampers proper analysis of the situation on the ground and makes it difficult to draw up risk and vulnerability maps. It also hampers the process of developing timely, identified, and effective responses and makes it difficult to anticipate the response, explains why, for a long time the national effort was essentially to react to disasters rather than prevent them [15, 16].

At the institutional level, an evaluation of performance of the institutional mechanisms and arrangements in place in relation to disaster risk reduction, conducted in 2018 [17], did highlight certain shortcomings, including: (1) the failure to adopt additional implementing legislation to make certain laws effective operational, (ii) the persistence of duplication between texts to the extent that several tools and institutions they have implemented overlap, (iii) the failure to take disaster risk reduction into account in environmental impact assessment and (iv) the failure to formalize the results of certain experiments that have proved their effectiveness in disaster risk management [17, 18].

It is obviously necessary to move away from an approach to disaster risk management that consists of reacting when disasters occur by focusing on emergency responses rather than promoting preventive interventions and minimizing the consequences. The country should focus on producing quality data and strengthening the institutional mechanism to put in place a reliable system with appropriate methods for collecting and making available data, strengthening the mechanism for processing this data and producing information to revitalize the early warning system and any other prevention mechanism.

A possible improvement to the current state of affairs is to develop a methodology that will help identify the impacts of droughts and floods a better spatial resolution than current governmental products.

The SPI-based identification of extremely wet and dry years approach will be based on easily accessible data (remote-sensed precipitation, population data) and generate estimates of affected populations. can be applied to past disasters and strengthen our understanding of these risks, identify hotspots that will be under increased surveillance when a flood or drought is imminent or ongoing.

The objective of this paper is to develop a simple methodology to identify extremely wet and extremely dry years using the Standard Precipitation Index (SPI) and then map the impacts for the driest and wettest year between 1979 and 2020.

The benefits of the generated information and avenues for generating even more useful risk products for disaster risk management in Niger are then discussed.

Methods

The Standardized Precipitation Index (SPI) is used to identify extremely dry or extremely wet years. Based on year-by-year mapping of these events, the principle is to identify areas affected by extreme climate events and to use them as an area to extract the physical and socioeconomic parameters needed for disaster risk management.

Approach and Sites Selection

The approach adopted is an entry by agroecological zone of Niger [8] for the targeting of localities where secondary data on rainfall and runoff will be collected [19]. In each agroecological zone selected, the targeted localities were those for which the capitalized data cover a period of 44 years (1979-2022). The research was conducted by using the Standardized Precipitation Index (SPI) to spatialize climate risk profile of the selected area of the country by assessing floods risk and droughts recurrence at each of the 3935 geolocated villages of more than 1000 inhabitants in the country.

Rainfall Data

A long series of proxy rainfall data has been collected from NASA open data. This series covers 3935 localities geo-referenced by ReNaLoc and targeted based on their demographic weight (villages with more than 1000 inhabitants in 2022) [20]. Based on the extraction of satellite data provided by International Research Institute for climate and Society [19], annual rainfall amounts were calculated for each locality from 1979 to 2022.

Calculation of SPI and Characterization of Years with Extreme Events

The characterization of years of extreme climatic events is based on an analysis of the standardized precipitation index (SPI). Since it is standardized and can be used for both wetter and drier climates, it has been used to identify years of low precipitation (drought) as well as wet years. To make this assessment, proxy rainfall heights were collected from 1979 to 2022, covering 3,935 localities, including 88 localities in Sudanian zones, 3,271 in agropastoral zones, 554 localities in pastoral zones and 22 localities in desert zones. The SPI was calculated based on annual rainfall from 1979 to 2022, using the formula as follows:

$$SPI = \frac{(x - \mu)}{\sigma}$$

Where:

***x** is the amount of precipitation recorded in a given period,*

***μ** is the mean precipitation over the same period, and*

***σ** is the standard deviation of the precipitation over the same period.*

This long-term record is fitted to a probability distribution, which is then transformed into a normal distribution so that the average SPI for the desired location and period is equal to zero [19, 20]. Positive values of the SPI indicate precipitation above the median and negative values indicate precipitation below the median. As the SPI index is standardized, wetter and drier climates have been represented in the same way in this characterization of extreme events [21].

The characterisation approach is in line with McKee et al [22], who used the classification system shown in the table of SPI values below (Table 1) to define the drought intensities resulting from the SPI. They also defined the criteria for a drought event for each time scale selected. Thus, a drought event occurs whenever the SPI is continuously negative and reaches an intensity of -1.0 or less. The event ends when the SPI becomes positive again. Each drought episode therefore has a duration defined by its start and end, and an intensity for each month during which the episode continues. Depending on whether the value is negative (drought) or positive (humidity), its trend is used in accordance with the classification in Table 1 to determine dry and wet years.

Table 1. SPI Values and Class Events

Class	Event
2.0+	extremely wet
1.5 to 1.99	very wet
1.0 to 1.49	moderately wet
-0.99 to 0.99	near normal
-1.0 to -1.49	moderately dry
-1.5 to -1.99	severely dry
-2 and less	extremely dry

Source: WMO, manual, 2012

The years with extreme events were identified by combining the average annual SPI calculated at global level and by agroecological zone. The list of years affected by these extreme events, based on climatic analysis using the SPI, was also compared with the list drawn up by the technical services based on disaster events history since the 1970s.

Identifying Zones of Impact of Climatic Events and Projection of Secondary Data

Impact zones were identified using maps based on the calculated average SPI [1, 9, 10, 18], and the maps obtained served as a basis for this identification. From these maps, the years to be considered are selected based on the extreme or close degree of the event, and the identified years are used to delimit the impact zones of extreme climatic events and to extract the data relating to the impact of the extreme events that have occurred.

Based on the projection of ReNaLoc data [20], georeferenced villages and their updated populations are projected into the selected zones, from which data extraction can also make it possible to specify their municipal affiliation. For areas marked by extreme humidity, geomorphological and hydrographic characterization data is also used, as a means of extracting data that provide information on flood risks. This identifying is carried out using the parameters below.

1. **Extreme aridity:** The value of negative SPI less than -1.5. These values are calculated according to the standard formula to determine SPI, which is = $(x - \mu) / \sigma$ (x is the amount of precipitation recorded in a given period, μ is the mean precipitation over the same period and σ is the standard deviation of the precipitation over the same period) (Table 2) [21-23].
2. **Extreme humidity**: Positive SPI value greater than +1.5. In contrast to aridity, all positive values greater than 1.5 are points of extreme humidity. They are also determined using the same SPI calculation formula as above.
3. **Extreme event impact zones**: All zones where projected SPI values are less than -1.5 for aridity zones and greater than +1.5 for humidity zones. The perimeters of these zones and their estimated surface areas.

Determining Key DRM Parameters and Extracting Relevant Data

The adopted principle is to determine disaster risk management parameters based on the impacted area. These parameters will encompass both information for the early warning system and data for preparing and anticipating the response to crises. To summaries, the above approach is applied to each of the parameters, depending on whether the primary data is calculated or extracted and the secondary data to be collected:

Primary Data Calculated and/or Extracted

1. **Extreme event impact zones**: All zones where projected SPI values are less than -1.5

for aridity zones and greater than +1.5 for humidity zones. The perimeters of these zones and their estimated surface areas.

2. **Geomorphological and hydrographical characteristics**: The topographic layers showing the relief and the hydrographic network will also be projected in the circumscribed impact zones to allow a more detailed analysis of the risk of flooding.
3. **Projected population**: For the selected year, the population is updated based on ReNaLoc data, 2012 [20] according to the formula below and projected onto the map of impact zones using the georeferencing of localities provided by ReNaLoc.

   $C_N = C_0 \times (1+X)^{N.}$

   X = rate of increase,

   N = number of years,

   C = population
4. **Population vulnerability**: This can be derived from the most recent proxy secondary data obtained from the survey of sentinel sites monitored by the Early Warning System Coordination Unit (CC/SAP) [7].

Secondary Data to be Collected

1. **Farm characteristics**: this will involve collecting data from the country's agricultural statistics services on the size of agricultural/pastoral farms according to the location of the impact zone in the country's agroecological zoning, the physical agricultural area per household, average crop/feed yields, cropping systems, etc.

Statistical Methods Used

Descriptive statistics were used to complete the analyses of the calculated SPI values or other parameters [24].

Results

The SPI was used to characterize the years and areas affected by extreme weather events. The use of the values of this index, calculated on the basis of average annual rainfall over the series from 1979 to 2022, is based on the verification of the hypothesis that, its average values for all 3935 geo-referenced sites and its disaggregation to the scale of the agroecological zones selected make it possible (i) to characterize the years and screen those affected by extreme events and (ii) to identify and analyze, according to the years targeted, the zones of impact of extreme events and identify the rational procedures for effective and objective evaluation of the impacts of these elements.

Characterisation of Extremely Wet and Extremely Dry Years

Based on the overall averages of the SPI calculated for all the sites and those of the sites divided by agroecological zone [5] previously selected, the years were first classified according to whether they were extremely wet or extremely dry according to the event class of the World Meteorological Organization [21]. The occurrence of extreme weather events is calculated for each year, which makes it possible to determine the number of times the same year occurs in different agroecological zones. The years marked by extreme humidity events (extremely wet to very wet) and those marked by dry events (extremely dry to severely dry) were selected. The table below gives a list of *eleven* years in the series from 1979 to 2022, two of which are particularly dry (1984 and 1987) and *nine (9)* of which are wet. Of these, seven are extremely wet (1994, 2014, 2015, 2017, 2019, 2020 and 2022) and two are very wet (1999 and 2012).

Table 2. Years with Occurrence of Extreme Events

Years	Occurrences' extreme events				
	Extremely wet	Very wet	Severely dry	Extremely dry	Occurrences
1984	-	-	3	1	4
1987	-	-	1	-	1
1994	1	2		-	3
1999	-	4	-	-	4
2012	-	3	-	-	3
2014	1	-	-	-	1
2015	1	-	-	-	1
2017	1	-	-	-	1
2019	1	-	-	-	1
2020	1	-	-	-	1
2022	1	-	-	-	1

Sources: SPI from data by agroecological zone, in Niger

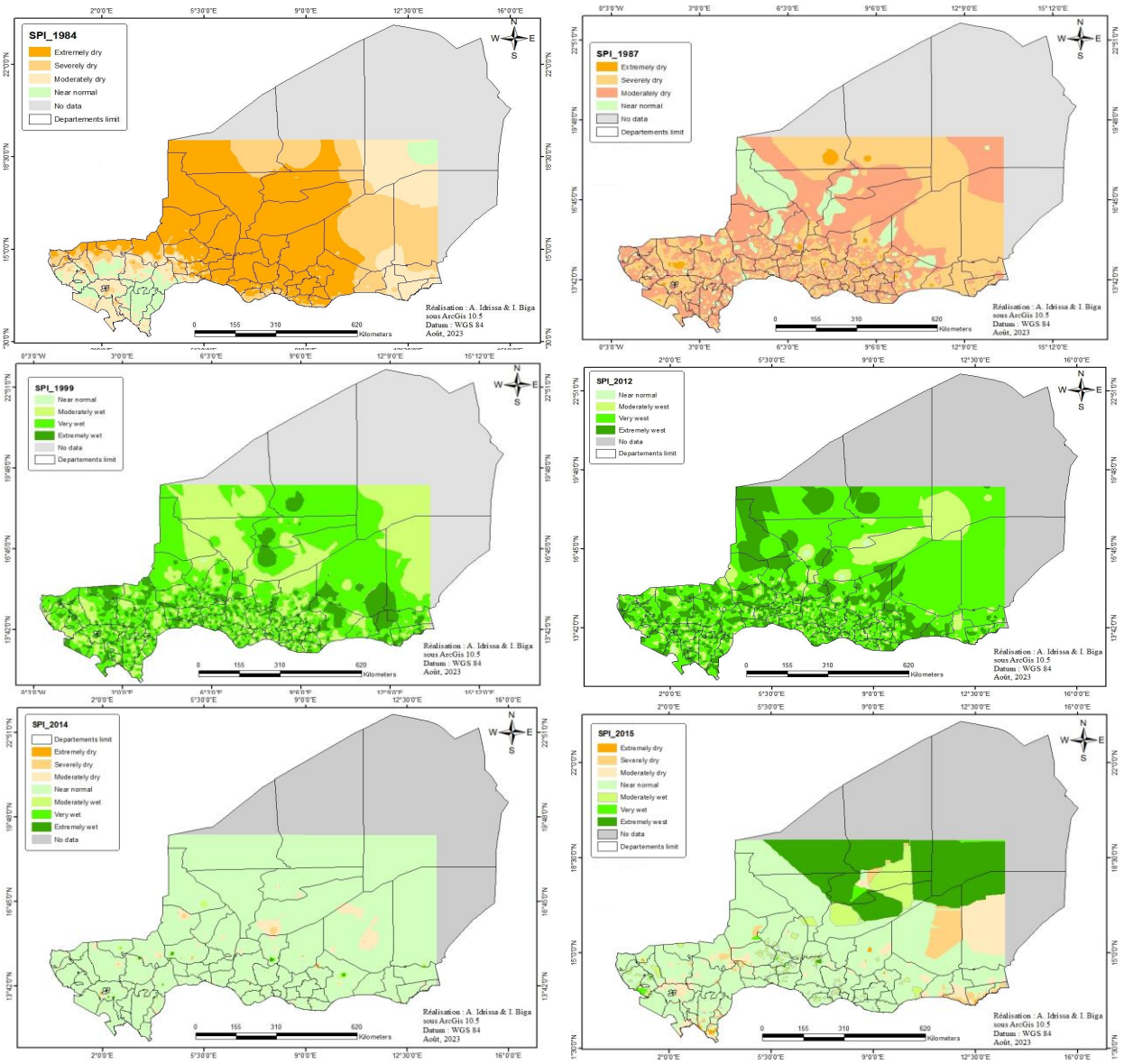

Figure 1. Geolocation of Areas Affected by Extreme Events in Niger in 1984, 1987, 1999, 2012, 2014 and 2015

Identification of Impact Zones According to the Years Characterized

The characterization of the years carried out based on the calculated SPI values made it possible to target eleven years affected by extreme events as illustrated in table 2 above. For each of these years, an in-depth analysis is carried out based on the graphical representation of the SPI calculated for all the sites selected as part of this study. As these sites were georeferenced, annual spatialization maps were drawn up with the calculated SPIs. On each of the maps drawn up, the areas affected by extreme drought and/or flood risk events were marked as shown in figure 2. Then surface areas, administrative location at municipal scale and populations affected were estimated.

Another level of characterization involved estimating the areas impacted by extreme events in each of the years targeted. This estimate covered 648,212 km^2, i.e., more than half of Niger's land area, but covering *at least* 98% of the country's agricultural and pastoral land.

Table 3. Area by Year and by Event Class as a Percentage of the Total Area Covered by the Study

Year	Area extremely dry (km^2)	Area very dry (km^2)	Area very wet (km^2)	Area extremely wet (km^2)
1984	-	15.09%	2.44%	0.98%
1987	21.35%	29.11%	1.77%	1.62%
1994	5.99%	36.10%	3.45%	0.90%
1999	31.08%	19.93%	1.94%	1.14%
2012	42.04%	14.24%	2.04%	1.34%
2014	36.01%	23.28%	2.20%	1.14%
2015	29.84%	27.41%	2.24%	1.34%
2017	33.61%	21.17%	1.68%	1.50%
2019	36.06%	23.13%	1.64%	1.63%
2020	34.12%	26.40%	2.28%	1.21%
2022	31.67%	24.32%	1.88%	1.68%

Identifying Representative Years According to the Impact of Extreme Events

Although, a priori, any year can be used to carry out this approach, the most representative years to be used as a basis for the present analysis were identified on the basis of the characterization of the years carried out [16] using the standardized precipitation index and the updated population projection from ReNaLoc [20], which allowed us to estimate the populations affected in each locality according to the class of extreme climatic event. The option is to carry out this process over two identified years from among the eleven years screened [16] in the series from 1979 to 2022. For this purpose, the years marked by the most extreme impacts of aridity and humidity are chosen to ensure that the two most frequent hazards in Niger, namely drought and floods, are addressed. The combined use of the rainfall index and the projection of the updated number of inhabitants to extract the impacted populations made it possible to identify the years 1984 and 2012, which have been two typical years for extreme events in Niger since 1979. 1984 was a particularly arid year, with 70% of the country's population affected by aridity, while 2012 was a particularly wet year, with 86% of the population affected and exposed to the risk of flooding, as shown in Table 4 and Figure 2 below.

Table 4. Populations Affected by the Extreme Event Class

Year	Event	Number of localities	Population affected (x1000)	Number of households (x1000)	% of households affected
1984	Extremely dry	16,286	3,700	529	55
	Severely dry	4,619	973	139	15
	Moderately dry	5,348	1,141	163	17
	Near normal	5,418	886	127	13
	Total	31,671	6,700	957	100
2012	Near normal	162	75	11	0
	Moderately wet	4,529	2,272	325	13
	Very wet	16,931	8,987	1,284	53
	Extremely wet	10,040	5,580	797	33
	Total	31,662	16,914	2,416	100%

Source: Calculated data

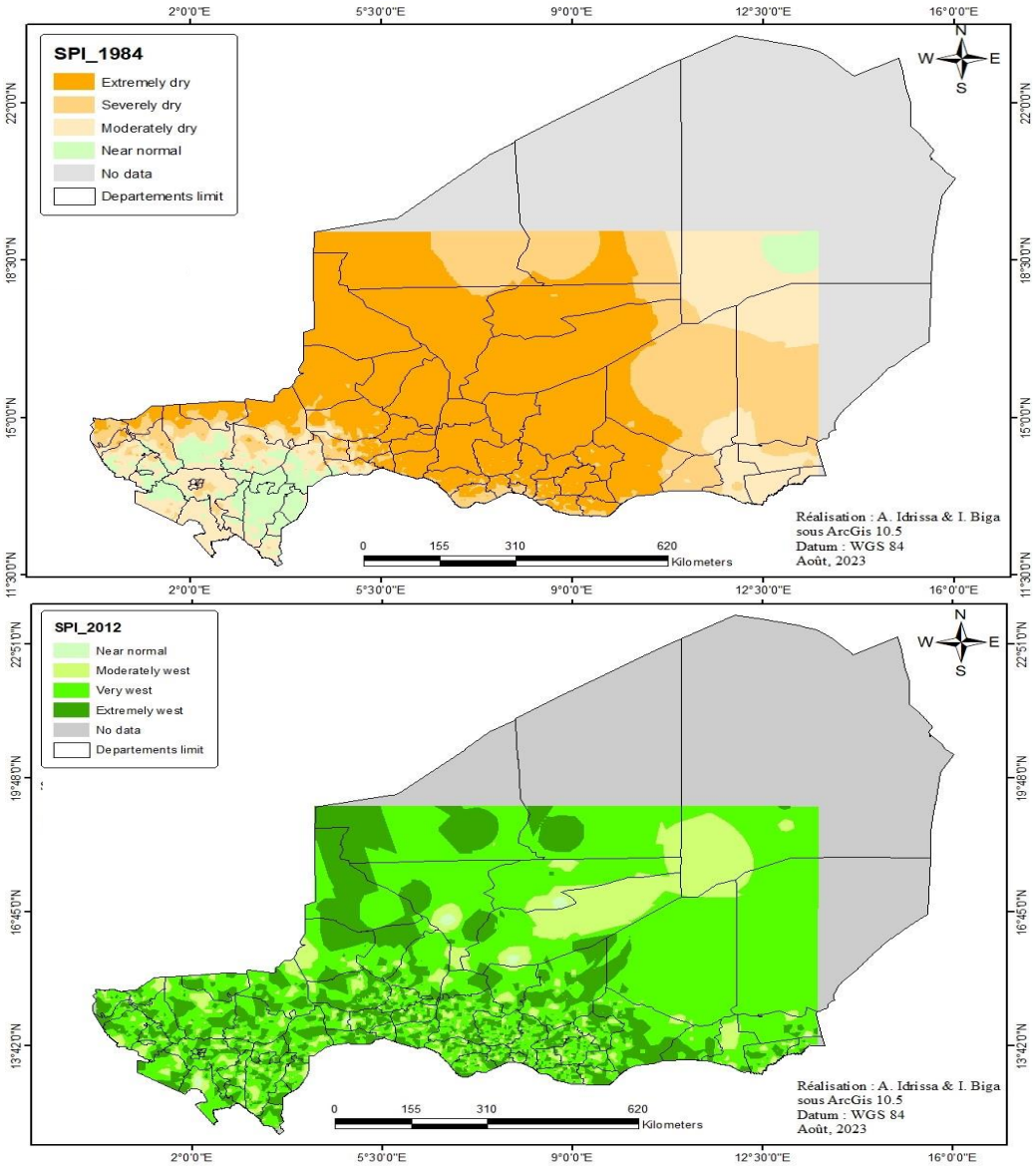

Figure 2. Years Selected (1984, 2012) for Application of the Data Analysis Approach

Impact Zones for Climatic Events and Projection of Secondary Data

The identification of impact zones for extreme climatic events was based on the two years 1984 and 2012. Thus, based on the mapping carried out with the SPI calculated from annual rainfall data over the long series from 1979 to 2022 collected from nearly 4,000 georeferenced villages in Niger. These maps were used to delimit the zones impacted by extreme events according to the class established [21]. They also served as a projection medium for other types of georeferenced information, namely the population updated from ReNaLoc 2012 [20], the administrative boundaries of the regions, departments, and communes, the surface area of georeferenced localities, and the mapping of the hydrographic network. Thus, based on the maps for the two reference years (1984 and 2012), the areas of the territory impacted by extreme and severe aridity events on the one hand and extreme and intense humidity events on the other are identified (Figure 2).

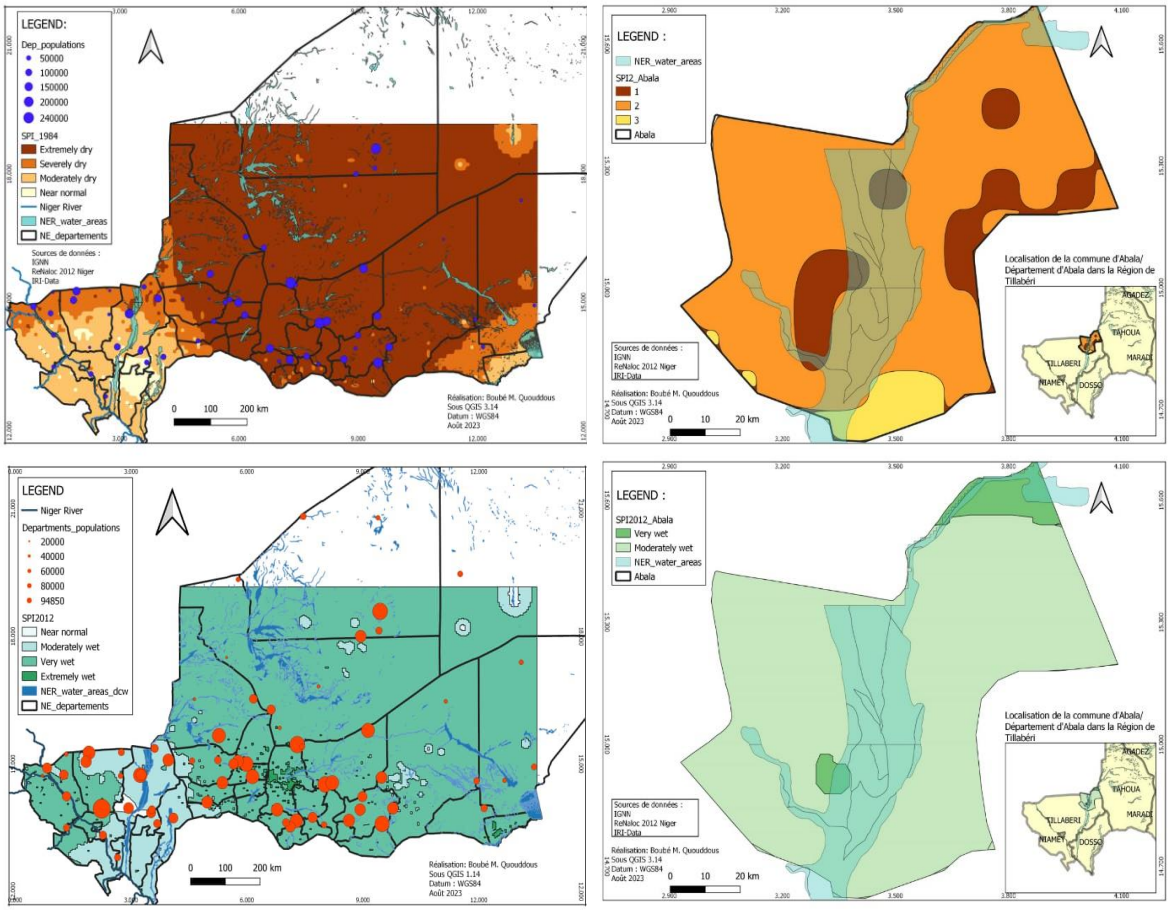

Figure 3. Mapping and Delimitation of Zones of Extreme Events and Populations Affected for 1984 and 2012

Extreme Event Impact Zones

The delimitation of extreme event impact zones is the key phase in this process. To do this, it is necessary to collect rainfall data collected and a map of the administrative boundaries. These data may be observation data, where a dense rainfall network is available, and/or estimated data, as in the case used in this analysis, where it was possible to extract estimated rainfall data from georeferenced data in nearly 4,000 localities in Niger [20]. These localities are also classified according to the agroecological zones [8] defined in the country to add a dimension of spatial analysis. The rainfall data collected, whether from the national

observation network and/or extracted proxies, will have to be organised in appropriate time steps to meet the need to produce information for rapid and/or early warning. For the purposes of this analysis, the annual time step has been considered, but the decadal or monthly time steps would be more relevant and would make it possible, at the end of each time step, to calculate standardized rainfall indices and to circumscribe the zones of impact of climatic events according to whether the zone is extremely arid, normal, or extremely humid. This mapping allows one to assess the extent and location of events as a basis for analysis and data collection, as illustrated in Table 4. It should be noted here that disaggregation is possible down to locality level using secondary data from the country's geographic information system. However, to have a more precise level of analysis, it is important, as mentioned above, to have as short a time step as possible. In the case of Niger, this time step could be a decade, which would make it possible to cross-reference the analyses with those of other products already in place.

At the scale of the zones identified with extreme climatic events with impact, it is essential to have data on the geomorphological and hydrographical characteristics to superimpose them to enable another level of analysis linked to exposure, particularly about zones of extreme humidity and, therefore, at risk of flooding. As part of this analysis, the hydrographic network of Niger was used to complete the mapping carried out based on the standardized rainfall index, and the Niger localities were used to extract localities located in extremely wet areas.

Table 5. Area by Year and by Event Class Affected

Year	Event	Number of localities	Area (km^2)
1984	1-Extremely dry	16,286	385,233
	2-Severely dry	4,619	194,381
	3-Moderately dry	5,348	138,569
	4-Near normal	5,418	47,454
2012	4-Near normal	162	3,488
	5-Moderately wet	4,529	115,917
	6-Very wet	16,931	463,143
	7-Extremely wet	10,040	183,180

Source: Calculated data.

Population affected: The population affected under this approach can be determined by updating data from ReNaLoc, 2012 [11] using the formula:

$C_N = C_0 \, x \, (1+X)^{N.}$

X = rate of increase,

N = number of years,

C = population.

This formula was used to update the number of inhabitants to be considered for each of the two years selected, 1984 and 2012. The estimate is made for all 32,000 georeferenced localities in ReNaLoc. The updated data are projected onto a map based on the standardized precipitation index calculated on an annual time scale but could also be calculated on a decadal or monthly time scale depending on the quality and sensitivity of the information required. The information extracted from the affected population can be used as a basis for preparing the emergency response if it is analysed immediately at the end of the campaign. This SPI-based identification of extremely wet and dry years approach makes it possible to identify the localities affected, the populations affected, and their administrative affiliation.

Table 6. Population Affected by Year and Event Class

Year	Event	Number of localities	Population
1984	1-Extremely dry	16,286	3,699,807
	2-Severely dry	4,619	973,323
	3-Moderately dry	5,348	1,141,173
	4-Near normal	5,418	886,006
2012	4-Near normal	162	75,205
	5-Moderately wet	4,529	2,271,869
	6-Very wet	16,931	8,986,492
	7-Extremely wet	10,040	5,579,887

Source: Calculated data

Also, based on the data collected on the affected population, a demographic analysis can be carried out (age, sex, marital status, income or poverty level, level of education and employment status), for which the type of property and the area can provide a useful approximation for the identified community based on the impact of extreme climatic events. It can also be used to conduct in-depth analyses of the identify population in terms of vulnerability and resilience capacity [27]. This, combined with other impact parameters, particularly agropastoral production, can be used to develop a detailed impact assessment for each commune and locality. For this, the secondary data analysed by the early warning system coordination unit [16] and the agricultural statistics services can help provide proxies for all the identified localities, but, if necessary, new surveys can be used to refine the situation.

The SPI-based identification of extremely wet and dry years approach used to characterize and target years based on the extreme climatic events experienced and determined by using the calculated average value of the global SPI and at the agroecological area level, gives results demonstrating the similarity between the years characterized according to this approach and those documented according to the history of disasters in Niger [12]. Of the eleven years characterized according to the calculated SPI, there is a concordance with those listed in the history of natural disasters recorded in Niger since 1904 [17]. This concordance [Table 7] therefore proves the relevance of the approach used to target the eleven years selected for this study and confirms the coherence of the characterization work of the zones and impacts of extreme climatic events to be carried out according to the approach.

Discussions

Table 7. History of Disaster and Extreme Events in Niger

Climatic hazards recorded	Year	Extreme event characterized
Drought	1984	Severely dry
-	1987	Severely dry
Flood	1994	Extremely wet
Flood	1999	Very wet
Flood	2012	Very wet
-	2014	Extremely wet
-	2015	Extremely wet
Flood	2017	Extremely wet
Flood	2019	Extremely wet

Flood	2020	Extremely wet
Flood	2022	Extremely wet

Source: history of disasters in Niger and characterization of extreme events

This approach also makes it possible to carry out a more detailed analysis for each targeted year and provides relevant data that can be used to feed into risk and disaster management mechanisms. In this case, the use of georeferenced data from ReNaLoc, 2012, combined with the mapping of SPI values calculated from the average rainfall estimated for almost 4,000 localities taken from ReNaLoc, enabled us to target the areas affected depending on whether it was an extreme drought and/or wet event (Figure 2). The in-depth analysis of the zones resulting from this characterization demonstrates the opportunity offered by this approach to have access to the relevant parameters involved in the issue of risk and disaster management, and this could well help to improve the early warning and preparedness aspect of risk management in Niger.

In a context characterised by inadequate availability of data or even an absence of quality data, any approach that makes it possible to remedy this shortcoming can only help to improve the effectiveness of the process for better disaster risk management. The SPI-based identification of extremely wet and dry years approach, used in the present study, carried out in Niger, is based on three fundamental inputs, namely (i) the mastery of physical parameters through the delimitation of zones impacted by extreme climatic events and the description of risk exposure factors, (ii) the determination of affected populations and the possibility of performing a demographic analysis based on the collected data, and (iii) the characterization of agricultural farms based on secondary data available from agricultural statistics services. The results of the study show that the use of geographic information can be used to collect relevant and useful data for risk and disaster management in a country where data collection systems are somewhat inadequate.

Initially, using rainfall data and the standardized precipitation index, the approach allows one to characterize the years [6] and identify the zones impacted by extreme climatic events. Then, to support the analysis at the scale of these identified zones of impact from extreme events, data on geomorphological and hydrographical characteristics are used and superimposed to conduct another level of analysis linked to exposure to risks, particularly about zones of extreme humidity and therefore presumed to be at risk of flooding. For the purposes of this analysis, the series of extracted data used is the average annual rainfall to calculate the Standardized Precipitation Index, which is a long enough time step to enable an analysis that would lead to information that could be used for warning purposes. Relatively short time steps, i.e., decadal, or monthly, would be more relevant and would enable standardized precipitation indices to be calculated at the end of each time step, making it possible to circumscribe the impact zones of climatic events quickly and predict their consequences. It should also be noted that this approach makes it possible to disaggregate information down to municipal level, as illustrated in the table below, and even to the level of the circumscribed zone if it does not coincide with the administrative boundary, which constitutes a major advance in the disaggregation of information that has hitherto been limited to department level in Niger. The acquisition of information down to the locality level (Table 6) using secondary data from the country's geographic information system will improve this approach.

Table 8. Disaggregated Data for Areas Affected at the Municipal Level, 2012

Municipality	Event	Localities	Area (km^2)
Bader Goula	Extremely wet	162	1,677
	Very wet	55	406
Bouza	Extremely wet	3	31
	Moderately wet	1	26
	Very wet	100	456
Kornaka	Extremely wet	47	260
	Very wet	252	1,449
Maiyara	Extremely wet	6	22
	Very wet	116	464
Grand Total			

Source: Calculated data

Second, the affected populations of the circumscribed impacted areas are extracted using the ReNaLoc data, which are updated and projected by year / current period. This extraction of affected populations provides data disaggregated by commune or by circumscribed area, which is also a step forward from the current data collection system, which is limited to the Department level. Data collected on the affected population can be used to perform a demographic analysis of the objectively identified community based on the impact of extreme weather events and to conduct in-depth analyses of the identified population in terms of vulnerability and resilience [25-27]. This, combined with other impact parameters, such as production, makes it possible to draw up a detailed impact assessment for each commune and locality.

Table 9. Disaggregated Data on Populations Affected by Events in Municipalities, 2012

Municipality	Event	Localities	Population
Bader Goula	Extremely wet	162	67,089
	Very wet	55	16,224
Bouza	Extremely wet	3	6,724
	Moderately wet	1	5,575
	Very wet	100	98,099
Kornaka	Extremely wet	47	19,508
	Very wet	252	108,697
Maiyara	Extremely wet	6	2,569
	Very wet	116	53,329
Grand Total		**742**	**377,814**

Source: Calculated data

Third, the analysis of proxy data on the characteristics of agricultural farms in areas affected by extreme climatic events provides parameters for a rapid assessment of impact of the events on agricultural production. This type of data can be used to deeper analyze the situation, particularly in the case of areas and populations affected by extreme aridity events with a high risk of drought, but it can also be used to analyze the situation in areas at risk of flooding.

The data to be collected from the country's agricultural statistics services, depending on the level of disaggregation of the affected population, will be the average size of agricultural/pastoral holdings according to the location of the impacted area in the country's agroecological classification, the average physical agricultural area per household, average crop/forage yields, etc.

Determination of Certain Key of DRM Parameters and Extraction of Their Data

A monitoring system designed to provide early warning and collect basic data to anticipate crisis must be able to quickly identify vulnerable areas and have up-to-date data to enable it to perform essential primary analyses. To achieve this objective, it is essential to determine the parameters to be monitored and to define and clearly describe the approach to be followed. This study is a contribution in this direction and is based essentially on updated secondary data and certain primary data, such as rainfall, which is the key parameter used, and the standardized precipitation index, which allows a classification of areas and extraction of those that are extremely arid or humid. The first step in the approach is to use rainfall data and the standardized index calculated to define the zones impacted by extreme events and to extract information on the updated key parameters from these zones.

Conclusion

The results of this study clearly demonstrate that the geographic information approach makes it possible to determine the parameters and data that are relevant, useful, and usable in disaster risk management in a context where the institutional arrangements in place are not able to produce the right data in a timely manner.

The use of SPI calculated based on average annual rainfall over several geolocated sites may provide an approach for characterizing the impact zones of extreme climatic events in Niger and may help to improve the effectiveness of the campaign monitoring system used in Niger. This approach proves that SPI mapping can be used to geolocate areas according to whether they are affected by drought or extreme humidity as a key factor in the risk of flooding.

The delimitation of the impact zones of these extreme climatic events and the projection of population data onto these mapped zones can provide a solid basis for determining the parameters for assessing the impacts of disasters when they occur as a result, of extreme climatic events in the context of Niger, where the data collected is limited.

The SPI-based identification of extremely wet and dry years approach has shown that the use of standardized rainfall index data calculated from proxy rainfall data estimated for a large number of spatially representative sites spread over a given territory makes it possible to circumscribe and delimit the zones of impact of extreme climatic events (extreme and severe aridity and extreme and intense humidity), and thus constitutes a good way of monitoring and collecting appropriate data for the production of information for warning and vigilance messages if the time steps are close enough to allow this. Furthermore, within each circumscribed impact zone, the use of complementary available geographical information (geomorphology, hydrography, etc.) collected from the national GIS can help refine the characterization of the identified impact zone and determine the risk factors linked to exposure, particularly in the case of zones characterized by extreme humidity.

The results of this study demonstrated the possibility of extracting other key parameters, in particular the population explosion in each extreme event impact zone perimeter. The use of geo-referenced data from the national network of localities and the updating of population data from the reference year of the RGPH, 2012, makes it possible to project population data and extract those in the zones circumscribed based on the index of identified extreme events.

The data extracted from the affected populations makes it possible to construct an objective survey of the affected population and to conduct, on the one hand, a demographic analysis of the community circumscribed in the zones impacted by the extreme climatic events and, on the other hand, an analysis of the state of their vulnerability and their capacity for resilience.

As a result, the application of this approach makes it possible to: (i) delimit, down to locality level, the zones impacted by extreme climatic events and identify the localities affected by each type of extreme event produced. The delimitation of the impact zone can also be done using various rainfall data time steps, which can be decadal, monthly, or annual, which makes it possible to have more detailed information that can be used as a basis for warnings depending on the impact of the extreme event that has occurred. (ii) identify areas at risk of flooding according to their exposure to the hydrographic network and extract localities with their populations located within the rights-of-way of watercourses in areas of extreme humidity and therefore exposed to the risk of flooding, (iii) extract demographic data and identify localities with their impacted populations, which makes it possible to conduct a demographic analysis and household typology on this basis.

Limitations

Although the approach used has been shown to collect data relevant to disaster risk management, the annual time step used for the rainfall data collected was a limitation, to the extent that it made it impossible to assess the plausible variability during the season and obtain data that could be used as parameters in the early warning mechanism. The other limitation of this approach is its dependence on analyses of primary data collected to provide better information on the exposure and vulnerability of populations for which a rapid survey can provide reliable data to prepare a better response. These two limitations constitute avenues for future research.

Conflict of Interest Statement

All authors declare that they have no conflicts of interest.

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How the Special Needs Education Intervention Can Address the Learning Disabilities and Associated Psychosocial Problems in South Sudan, A Case of Jamjang Camps

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Abstract

The study on the Learning disabilities and associated psychosocial problems among children started in October 2022 in South Sudan. The deepening loneliness and vulnerability of the children with the learning disabilities and the associated psychosocial problems among children resulting from the conflict in Sudan, which tore the family union, social fabric in the community structures, and pushed the families into the refugee camps where they have limited access to livelihood that everything to nurture the children is at the appalling stage. The study aimed at ascertaining the presence of learning disabilities and associated psychosocial problems among children in Jamjang Refugee camps. The study used qualitative, quantitative, and ethnographical/anthropological methods to have in-depth comprehension of the facts surrounding the phenomenon. The tools used in the design include questionnaire, interview, and observation. The pilot study conducted in April 2023 ascertained the presence of learning disabilities among refugee children. This consist of dyslexia, dysgraphia, and dyscalculia elucidated as deficiency to write, spell, comprehend, articulate point in written, grammatical errors, poor paragraph organization, spelling errors, and poor arithmetic calculation. The study also confirmed the presence of the associated psychosocial problems which include low self-esteem, discrimination, bullying, stigmatization, neglect, sexual abuse, and rejection. Finally, the finding confirmed the learning disabilities cause the associated psychosocial problems among the children. Whereas the special needs education with the application of multisensory approaches, different recreational games, and Skinner's Operant conditioning theory, Cognitive Behavioral theory of Bandura are indispensably crucial in reducing the adverse effects of the phenomenon.

Keywords*: Auditory, Anxiety, Dyslexia, Dyscalculia, dysgraphia, Depressive disorder, PTSD, visual.*

Introduction

Learning disabilities and associated psychosocial problems among children is a growing phenomenon across the globe. Study shows the learning difficulties, intellectual disabilities, post-traumatic stress disorders (PTSD), depression, and anxiety disorders to be on the elevated prevalence among refugee children in Australia [1].

The learning disabilities are heterogeneous group of conditions with deficit in processing language, and frequently manifested in difficulty to comprehend, speak, read, write, spell, or do mathematical calculations; these include perceptual disabilities, and disorders that affect people's ability to interpret what they see and hear and how to link the information from different parts of the brain [2].

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Learning disability is known as the neurological learning disorder which consists of dyslexia, dysgraphia, and dyscalculia [3].

Learning disability is largely centered on the children who appeared normal in many intellectual skills, but also exhibits variety of cognitive limitations that interfere with their ability to read, write, and learn in the classroom [4].

Some children with specific learning disabilities have deficits in the basic psychological processes that interfere with learning and academic performance that leads to emotional and behavioral problems [5]. Many people with the learning disabilities have considerable multiples physical and mental health conditions that increase the risk of developing chronic conditions which affect how the person learns new skills, understand information, and communicate throughout their lifetime [6].

The learning disabilities comprised of the clinical views related to the problems in language abilities, manifested in difficulties in reading and writing. while the other problem is concerned with the nonverbal aspects, where the children have difficulties in the acquisition of complex motor movement, low coordination, poor balance, and postural control, decreased muscle tone, below average fine motor ability, arithmetic difficulties, and spatial problem solving, with possible linguistic difficulties in the productive domain [7].

The neurological disorders affect the learners' ability to either interpret what people see and hear or store information from different parts of the brain, and impede learning to read, write, or do calculable work and the ways to acquire basic academic skills [8].

However, the study suggests similarities between Asperger syndrome and learning disabilities that include the normal range of intelligence, uneven profile of skills, language difficulties, social and interpersonal deficits, cognitive disorganization, academic and interpersonal problems [9].

Traditional Learning Activities

Childhood neurological damage causes decline in the learning wherein the children receive the rehabilitative educational services. The 2007 report indicated that there were 2.7 million students in America's public schools who had learning disabilities. These students represented 44% of 6 million school-age children with all kinds of disabilities who received special education services [10]. The Girls Education South Sudan (GESS) reported the deep-rooted stigma and discrimination against persons with disabilities in South Sudan. The children with disabilities experienced neglect, abuse and kept at home without access to education [11]. The African Health Action reported the elevated mental health problems in Jamjang South Sudan, these consist of depression, anxiety, post-traumatic stress disorders and mental retardation [12]. The effects include the learning disabilities which prompted the need to explore the rehabilitative educational services to mitigate and address the increasing childhood neurological damage and impact in the refugee camps in South Sudan.

The Visual Learners

The teaching techniques for the children with dyslexic conditions require multi-sensory approaches which involves seeing, listening, speaking, touching with much variation as possible, and categorizes the teaching techniques into visual, auditory, and kinesthetic learners [13].

The visual learners can be assisted to learn in form of pictorial and multi-media materials; sticking to the spelling of words, looking at the pictures in the books before reading; playing games to improve memory; using the good visual software program and having an uncluttered work area [14]

The Auditory Learners

Similarly, auditory learners can be helped to read the books or the information, ensure that

the instructions are orally clear; and get the students to record the information to listen to it again and use the software with good auditory input [15]. The remedial treatment is used in the drillings and practices where the teacher provides clear examples of good handwriting, and the learners follow the instructions to practice the drilling, using the teacher's model. Hence, repetitive practice, along with correct position and pencil grip can help with this process and build fine motor skills, and help improve hand functioning, which leads to better handwriting [16].

The Kinesthetic Learners

The strategic method for addressing dyscalculia includes mathematical software, catch up numeracy programmes which help the learners to regain confidence and remember mathematical facts and enhance the ability to conceptualize numbers and solve the simple to complex mathematical problems [17]. The children with learning disabilities can be helped with specific learning strategies to enable them to read, comprehend and study better. This helps them to be organized to collect their information strategically and compensate with tutoring and classroom modifications such as un-timed tests and reduced workload, and direct intervention, which involves teaching learners on how to learn and become independent [18]. The teaching techniques for children with dyslexic conditions should be made multi-sensory involving looking, listening, speaking, touching with much variation as possible, and categorizes the teaching techniques into visual, auditory, and kinesthetic learners. The visual learners can be assisted to learn in form of pictorial and multi-media materials; sticking to the words spelling and looking at the pictures in the book before reading; playing games to improve memory; using the good visual software program and have an uncluttered work area. Similarly, the auditory learners can be helped to read the books or the information; making sure the instructions are orally clear; getting the student to record the information to listen to it again and using software which has good auditory input [15]

Mental Health and Social Support through Behavioral Activities

Psychosocial interventions are instrumentally crucial for mitigating learning disabilities and the identification of behavioral interventions which involves personal, social, and environmental events which precipitate behavioral impact [19].

Behavioral Skills through Games

Significant number of educators acknowledged that the traditional teaching activities failed to match the learners needs, preferences, and expectations; hence the special needs educational services, behavioral therapeutic, and social impact of the serious games supported with gaming technology facilitated through the process of experiment, which fosters the development of the learners cognitive, spatial, motor skills and teach the learners how to solve complex problems. These foster creativity, genuine collaboration, and range of emotions such as joy, empathy, anger, frustrations, and memorization which enhanced motivation, engagement, and progress in a variety of skills and abilities [20]

Skinner B.F theory of operant conditioning is crucial and instrumental tool for the psychosocial interventions that improve not only the psychological dimensions such as thinking, attitudes, and motivation, but also social learning such as teaching and reinforcing new behavioral skills and social discussion aimed at improving mental wellbeing [21].

Behavioral Skills through Work-Skits

Bandura identified three areas for learning which consist of observation, imitation, and modelling, and termed observational learning in his experiment as an effective attention, retention, reciprocation, and motivation. He stressed that children learn through behavioral

imitation, observation, and modeling of other people [22].

Bandura elucidated in Social Cognitive Theory that development of cognitive competencies can be accelerated by symbolically modeling the reasoning strategies for domains, highly informative ways of which the great deal of human thought is linguistically based.

Hence, the children acquire knowledge about objects and the relationships between them through nonlinguistic processing of direct and vicarious experiences. Such understanding helps to impart meanings to linguistic symbols and by relating the utterances, they hear to what they understand to be going on at the time [23].

Behavioral Responsibility Skills

Bandura emphasized on changing overt behavior which comprised of environmental changes and social interactions using approaches that enhance self-control and focuses on the client responsibility and the therapeutic relationship, and intervention approaches used in behavioral therapy. These approaches include coping and social skills training, contingency management, modelling, anxiety reduction and relaxation, self-management methods and behavioral rehearsal. In addressing the educational issues, it focusses on two traditional cognitive behavioral learning and changes such as cognitive restructuring and social skill training, social and community responsibility therapy and social-community responsibility skills training [22].

The Social Rehabilitative Support (SRS)

The social rehabilitative support carried out covered three areas of behavioral activities which comprised of games, work-skits, and responsibility skills. The observational checklist tables captured the social rehabilitative support to reduce childhood neurological damage covering the three areas of behavioral activities which are useful such as anthropological study tools.

Methodology

The study used qualitative, quantitative, and anthropological methods to have an in-depth understanding of the learning disabilities and the associated psychosocial problems in the refugee camps. Given the complexity of the phenomenon under study, the researcher used Mugenda (2003,42) method which takes ten percent as the approved sampling size for qualitative sample. The purposive sampling technique was used to select 60 (32F, 28M) learners out of the 600 learners with disabilities and selected 55 (20F,35M) out of the 550 teachers recruited in camps schools. The teachers were purposively selected to pick those with special needs education skills who are entrusted for teachings of the learners with disabilities in schools.

Presentation, Discussion, and Results

The results show the special needs educational services improve on the learning disabilities and psychosocial problems in Jamjang refugee camps.

This came with introduction of the extracurricular and behavioral activities through sport which targeted all the learners with measure focusses on children with learning disabilities and those coming from conflict areas in all the schools and child friendly spaces to enhance their academic performance, as well as physical and psychosocial wellbeing. These consist of football, volleyball, athletic, skipping rope, talent show, dominoes, and dice which were aimed at improving the learners' participation, boost physical and psychosocial wellbeing, memory, talents, social interaction, discipline, boost reading and arithmetic calculation. While the poem, storytelling, recite the songs build talents on public expression, and use of the art therapy were used to identify the learners' lives situation at home and school.

In line of the above anthropological observational checklist of the special needs' education intervention, the behavioral games were used in Jamjang refugee camps by

educational actors to enhance the extracurricular activities in all the schools and child friendly spaces. These consist of football, volleyball, athletics, skipping rope, talent show, dominoes, and dice which enhanced and improved the learners' participation, boosting physical and psychosocial wellbeing. Similarly, the cocurricular activities enhanced the learners' memory, talents, social interaction, discipline, boost reading and arithmetic calculation.

The result in the table 1 below also showed that out of 48 children with learning disabilities who were engaged in sport, 87.5% had an enhanced self-esteem, confidence in social interaction, lessened anxiety, and depressive symptoms, improved physical and psychosocial wellbeing, increase happiness, resilience, and relaxation. Out of the 20 learners who were engaged in playing dominoes and dice, 85% of them improved self-confidence, social interaction, and arithmetic calculation. Similarly, out of the 10 learners who played rope skipping, 90% of the learners improved physical & mental wellbeing. The learners equally enhanced spelling and numerical by reciting words and improved on social interaction which increased joy.

Out of the 30 (15 boys, 15 girls) who participated in the talent show, 100% of the learners had an impactful enhancement in participation, and interaction, improved physical and mental wellbeing.

In one instance of the physiological development, the 16-year-old female learner with cerebral palsy conditions that affected her motor systems since earlier childhood where she became a wheelchair-ridden or crawl on her knees up to her enrollment in primary school 6 years ago. The learner could participate in random games and joyfully run on her knees while playing with fellow learners. Her limbs became stronger over time, and gradually started learning to stand on her feet and finally walking with clumsy movement now.

Table 1. The Games Behavioral Activity

	Activity Done	Type of Learners Expected	Benefit Expected	Time Space	Results Obtained	Principal Caretaker	Sponsor
1	Sport (Football, volleyball, and athletic)	48 (24 boys and 24 girls) between 6-17 years old	Improve participation boost talents and psychosocial wellbeing.	School and child friendly spaces	42 (25boys & 17 girls) learners had an enhanced self-esteem, confidence, social interaction & networking, lessened anxiety, and depressive symptoms, and increased resilience and relaxation	School admin	LWF
2	Dominoes & Dice	20 Boys Between 6-17 years old	Enhance discipline & observe rules, enhances memory, critical & strategic thinking.	-	17 learners improved in observing game rules, social interaction skill, visual perception and few arithmetic calculation.	Child friendly spaces every evening	LWF
3	Skipping rope game	10 Girls 6-17years old	Improve health, memory, and social interaction.	-	9 learners improved physical & mental wellbeing. Enhanced reciting numerical count, and social interaction, and finally became joyous.	School and child friendly spaces everyday	LWF
4	Talent show	30 (15 Girls and 15 boys) 6-17 years old	Enhanced talent	School	30 (15 boys, 15 girls) enhanced participation, and interaction, improved physical and mental wellbeing	school	LWF

Table 2. The Work-Skit Behavioral Activity

	Activity Done	Type of Learners Expected	Benefit Expected	Time Space	Results Obtained	Principal Caretaker	Sponsor
1	Poem	10 (5 Boys and 5 girls) 6-17 years old	Pass the message to fellow learners, teachers, parents, and leaders.	School & community function	7 (3 boys, 4 girls) learners enhanced word memory & confidence in speaking, Messages passed	School admin	LWF
2	Recite songs	30 (15 Girls & 15	Boost words	school	25 (15 girls, 10 boys) learners	School	LWF

	and storytelling	boys) 6-17 years old	memorization		improved reading alphabets, numeral count, and words spelling memory, and improved psychosocial wellbeing	admin	
3	Drawing	20 (10 Boys and 10 girls) 6-17years old	To identify psychosocial wellbeing	Child friendly spaces	Cases of the trauma, child abuse and neglect were identified and subsequently supported	Child protection	LWF and UNHCR
4	Play recorded lesson	60 (30 Boys & 30 girls) 6-17 years old	Improve reading, and auditory skill	Schools & FM radio	20 (12 boys, 8 girls) Enhanced reading, memory, phonetic sounds, and auditory skill	Teachers	Internews

Table 3. The Responsibility Skills Behavioral Activity

	Activity Done	**Type of Learners Expected**	**Benefit Expected**	**Time Space**	**Results Obtained**	**Principal Caretaker**	**Sponsor**
1	Hygiene & sanitation	10 (5 Boys-5 Girls 6-17 years old	hands washing after visiting latrine. maintain environment. clean	School everyday	6 (2boys, 4girls) learners had an improved personal hygiene & environmental cleanliness	School administration	LWF
2	Gender segregated signposts at the latrine blocks	All Boys & girls 6-17years old	Protection & discipline	schools	Improved safety of the learners on sexual abuse in school	School admin	LWF
3	Health risk posters	All Boys & girls 6-17years old	safety and awareness raising	school	Understand the risk of HIV/AIDS, covid-19, and safety measures for diseases prevention	School Admin in collaboration	-
4	Timely arrival to school	All Boys & girls 6-17years old	Time punctual & obedience to rules	school	Observe rules & instructions,	School admin	LWF

Meanwhile in the responsibility skills of behavioral activity, the education actor LWF introduced this activity to enhance learners' safe learning environment, physical and mental wellbeing through environmental health, hygiene, and sanitation. This activity fosters change of lifestyle among the learners regarding the health risk sensitization, such as cholera, covid-19, and human immunodeficiency virus, and acquired immunodeficiency syndrome (HIV/AIDS).

In the anthropological study in which 60 (32F, 28M)) children with different kind of disabilities were interviewed, 73% of the interviewed population were found with the learning disabilities which comprised of the difficulties in writing, spelling, reading, following grammatical rules, following straight line in writing, poor memorization, difficulty in performing basic arithmetic calculation and numerical count.

Out of the 10 learners who were engaged in hygiene and sanitation practices, 60% of the learners had improved personal hygiene & environmental cleanliness.

In an instance of the 14-year-old dyslexic primary 4 learner, despite his age and grade, he was unable to spell 'girl, father, and man' correctly. Instead, he spelled the girl as 'biu', father as 'eam' and man as 'mai'.

Another example of the 17year dyscalculic learner despite being in primary 3, was unable to make basic arithmetic calculation. E.g., 5+5=1 and 5 ÷5=5 which were all wrong

Associated Psychosocial Problems

The study found most of the children with learning disabilities were facing harsh situations from the learners, teachers, families, and communities. The children with learning disabilities experience emotional abuses from the peers in the community, and fellow class and schoolmate by bullying, singing of songs that stigmatize the learners with poor academic performance popularly known as 05% in Jamjang camps schools. The children with learning disabilities expressed frustration, anger, low self-esteem, feeling discriminated against, and stigmatized for being bullied by their fellow learners, which subsequently caused anxiety and depressive disorder.

Meanwhile the children with learning disabilities experience parental neglect which include no bathing, clothing, and lack of care for emotional attachment. In furtherance, some children with learning disabilities complained of harsh treatment from the teachers, which include physical and emotional abuse during lessons.

The African Health Action (AHA) reported the elevated mental health problems in Jamjang camps, South Sudan, these consist of depression, anxiety, post-traumatic stress disorders and mental retardation [12].

Findings and Discussions on Hypothesized Notion that the Special Needs Education Services Reduce the Learning Disabilities and the Associated Psychosocial Problems

Considering the existing special needs' education services intervention that consists of sign language, braille instructions, and the variety of extracurricular activities introduced in Jamjang camps schools to foster the learning and mitigate the adverse effects of the learning disabilities and psychosocial problems.

The special needs intervention included additional approaches in the cases of learning disabilities and psychosocial problems. The approach encompasses cocurricular activities that comprised of football, volleyball, skipping rope, swing, talent show, drama, dominoes, ludo, draw therapy, and sing of songs. These extracurricular activities were aimed at addressing physical, emotional, mental, social, cultural, and academic problems. Nevertheless, the approach made number of achievements in the learning disabilities and psychosocial problems that made this multisensory approach indispensably effective in school and child friendly spaces where children were subjected

to playing variety of games after school hours. This approach subsequently improved the learners' self-esteem, confidence, social participation, reduced anxiety and depressive disorders and increased resilience. The multisensory approach made a significant improvement on children's physical, emotional, mental, academic, and social wellbeing.

The other approach includes drama, drawing therapy, fastening words in songs to improve learning, memory, participation, self-esteem, confidence, self-expression, mental and physical health, and enhance academic performance.

Despite all the achievements of all the approaches in mitigating the learning disabilities, the lack of guidance from the teachers in tailoring the games into learning, made it harder not only for the learners with the learning disabilities to improve writing, spelling, arithmetic calculation, grammatical errors and to follow the straight line, but lose the intended value and therefore become a routine traditional game without significant impact.

This is largely attributed to the teachers' lack of knowledge and skill to apply the multisensory approach to improve the learning but using the game in a traditional way of recreation and passing time. The fact that the teachers do not apply the targeted extracurricular activities to specific category of learners in multisensory approaches to enhance the learning through the reciting of the words, spelling, alphabetical & numerical reading which are tailored in the game to improve the numeracy, spelling, writing, and vocabulary memorization reduced the impact of the tool.

It is worth noting that the multisensory approach is incredibly indispensable for the treatment of learning disabilities such as dyslexia, dysgraphia, dyscalculia, and mitigation of the associated psychosocial problems. The approach succeeded in the scenario of four (8-12yrs) dyscalculic learners who could not do mathematical calculation after being in primary school for 3-5 years. The learners succeeded in addition, and division of physical items after repeatedly given physical materials for numerical count, do arithmetic calculation on addition and division.

Contribution to the New Knowledge

Although the solitary use of traditional special needs education on the application of sign language, braille and mental health self-care were helpful in addressing hearing, visual, and mental impairment cases; the approach fell short not only on the mitigation of the learning disabilities such as dyslexia, dysgraphia, and dyscalculia, but also the associated psychosocial problems such as depression, anxiety disorders, attention deficit hyperactivity disorder in an effective manner.

This was proven in significant number of special need education learners including 7 visual-impaired and 3 hearing-impaired learners who did not respond well with the traditional education of sign language and braille instructions, and paradoxically believed to be uneducable wherein 30% of the learners with learning disabilities dropout. The sign language failed to address the learning gaps for the 2 learners with hearing impairment due to challenges in understanding and adjusting to the international sign language after being raised up in the environment where communication was on natural sign language. This discouraged the learners, and they drop out from the school.

The combined use of the traditional special needs' education approaches integrated with the application of mental health support and cognitive theories such as operant conditioning, cognitive behavioral theory, lesson recording, and multisensory teaching approaches such as looking, listening, speaking, touching with much variation as possible, and categorizes the teaching techniques into visual, auditory, and kinesthetic learners proved to be effective.

The visual learners can be assisted to learn in form of pictorial and multi-media materials; sticking to spelling words anywhere to be

viewed; looking at the pictures in a book before reading; playing games to improve memory; using a good visual software program and having an uncluttered work area. Similarly, the auditory learners can be helped to read books or the information to be learned; making sure instructions are orally clear; getting the student to record the information to listen to again using software which has good auditory input [15].

Given the fact that the study on learning disabilities was the first of its kind not only in Jamjang Camps, but it is the first study in South Sudan at large. This study was indispensably instrumental and impactful for both teachers and learners in paradigm shift from traditional teaching and learning to multisensory approach where different approaches are used to enhance the teaching and learning that mitigate the learning disabilities and psychosocial problems.

Conflict of Interest in the Research

Concerning the conflict of interest and disclosure, the researcher acknowledged the resources used in the study with references and maintained the integrity of the study in all aspects, and therefore declare no conflict of interest.

Conclusion

In conclusion, the learning disability is defined as a heterogeneous group of conditions with a deficit in processing language, and manifested in difficulty to comprehend, speak, read, write, spell, or do basic mathematical calculations, including perceptual disabilities, and disorders that affects people's ability to either interpret what they see and hear and how to link the information from different parts of the brain [2].

The African Health Action reported the elevated mental health problems in Jamjang South Sudan, consisting of depression, anxiety, post-traumatic stress disorders and mental retardation [12]. The effects include the learning disabilities which prompted the need to explore the rehabilitative educational services to address or mitigate the increasing childhood neurological damage and impact in the refugee camps of South Sudan.

The anthropological observational checklist of special needs education confirmed the hypothesized notion that the special need educational services reduce learning disabilities and associated psychosocial problems.

Behavior games and extracurricular activities were introduced at schools and child friendly spaces to improve learners' participation and boost physical and psychosocial wellbeing. This also enhance memory, talents, social interaction, discipline, boosts reading and arithmetic calculation. Although the approach was limited due to lack of technical skill from the teachers to apply the multisensory approach effectively. The approach succeeded in the enhancement of self-esteem, confidence in social interaction, lessened anxiety, and depressive symptoms, improved physical and psychosocial wellbeing, increased happiness resilience and relaxation.

Recommendations

Whilst it is important to use the special needs education services to address the learning disabilities, and associated psychosocial problems, it is essentially crucial to use multisensory approaches for better results in academic performance and behavioral change.

Extracurricular activities are vitally important for use to improve learning when they are properly tailored with learning activities and therefore should be used in special needs education interventions to enhance learning.

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Critical Review of Theories of Staff Turnover Intentions and their Implications to Staff Turnover in National Non-governmental Organizations in South Sudan

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Abstract

An employee remains to be one of the most valuable resources of an organization. Unfortunately, high turnover rate in the national non-governmental organizations in South Sudan continues to be a concern for them and various stakeholders. This is because organizations spend a lot of resources in training and investing in their employees. The purpose of the study was to review the various theories that explain staff turnover with the aim of understanding their distinct views. The methodology involved the review of literature of turnover theories and models. The researcher was able to find six theories that helped to explain the phenomenon of staff turnover, and each provided distinct factors that when not addressed could lead to staff turnover. Maslow's hierarchy of needs which identified different human needs which if not met could lead to staff turnover. Herzberg's motivation-hygiene theory revealed two factors that need to be addressed by an organization, namely, "motivation factors" and "hygiene factors". The Social Exchange Theory explains that turnover intentions come because of non-compliance with the agreed rules by either the management or the staff. LMX Theory emphasized the importance of maintaining good *relationships between leaders and members in different groups to promote better performance at work and minimize staff turnover.*

Keywords*: Staff Turnover, Turnover intention theories, The Theory of organizational Equilibrium, Theory of job embeddedness and Leader-Member Exchange (LMX) Theory.*

Introduction

According to [1], the current employee turnover in non-profit organizations hovers around 19-20% which is higher than that of for-profit organizations, which is currently around 13%. Therefore, managers of non-profit organizations should have retention plans. Employee retention matters in all organizations because the departure of employees makes the organizations incur overhead costs in recruiting and training new ones. Moreover, high turnover harms the image of an organization in the community which in turn affects an organization in maintaining existing partnerships with key stakeholders. The organization will also find it difficult to get new partners over time. Staff turn-over affect the morale of the remaining staff because they must take on additional tasks which can lead to stress, burnout, absenteeism and more turnover. If an organization improves its retention rate, it will reduce turnover costs and foster a more experienced team that can maintain existing partnerships, build new partnerships, and continue to advance the mission of the organization in society.

With such an alarming rate of turnover in non-profit organizations, there is an urgent need to

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invest in building workforce environments to ensure dedication and longevity among their employees [2].

According to [3], a high turnover rate can result in many challenges which can directly impact on the organization's revenue and profitability. Therefore, managers should keep their employees happy to protect their companies' revenues.

Organizations should understand employee turnover intention theories to enable them design programs to motivate their employees to decrease turnover. Understanding these turnover intention theories can also help individuals to understand their own needs and motivations to inform decision making [4].

Problem to be Solved

There are many theories developed over the years that explain and predict staff turnover intentions. These theories have different views when it comes to staff motivation. Managers need to understand the different theories in order to design effective strategies for staff retention.

Therefore, it is important to review various theories on staff turnover intention with the aim of developing an understanding of their distinct views on staff turnover intentions which can then be used to inform staff retention strategies.

Conceptual Background

In order to understand the various turnover intention theories, it is important to define turnover and understand the types. Two definitions of staff turnover are found to be important to our conceptualization: According to [5], turnover is defined as termination of an employment by an individual or otherwise a choice to leave an organization.

Employee Turnover is when an employee leaves their job and others join [6]. Therefore, staff turnover is the total separation from the company by staff voluntarily for either a new job or personal reasons.

Objective of the Study

To review staff turnover intention theories with the aim of developing an understanding of their distinct views on staff turnover intentions.

Limitation of Study

The limitation of the study has been the sole reliance on data uniquely drawn freely from Google Scholar papers. Internet access is also very expensive.

Research Methodology

The data was collected online with the help of search key word, "turnover intention theories" in Google Scholar. The researcher focused on finding facts related to each theory such as: origin of the theory, strengths of the theory, limitations and gaps and relevance of the theory to non-profit organizations. Details of each step is explained in the flow chart below:

Flow Chart of the Review Process

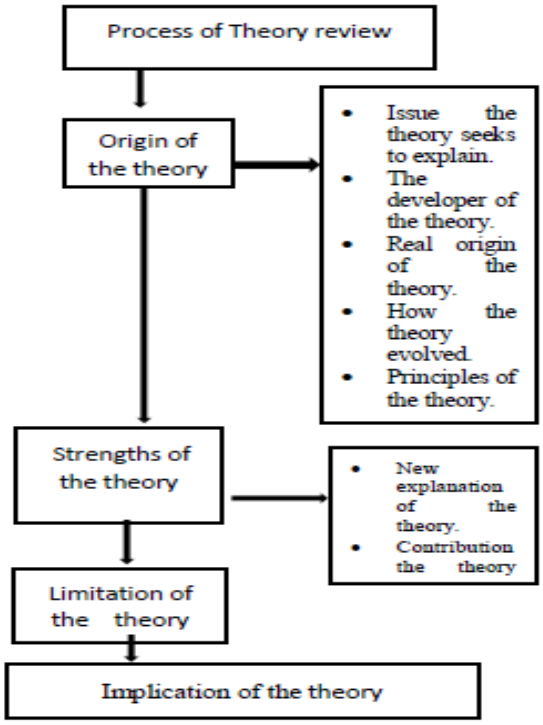

Figure 1. Steps of the Review for Each Theory (Source Research, 2023)

Results

Maslow's Theory of Hierarchical Needs

The theory was developed by Abraham Maslow, an American psychologist to explain human motivation. It was first introduced in 1943. According to Maslow, there is a relationship between human behavior and needs. The behavior changes as the needs are satisfied. Maslow identified five sets of human needs in order of importance and priority. Maslow classified the five needs into two: The lower-level needs which refer to our physiological needs and the higher-level needs which represent more to intrinsic or internal factors. The needs are often portrayed in the shape of a pyramid. According to Maslow, the lower needs must be met first before moving to the next level [7].

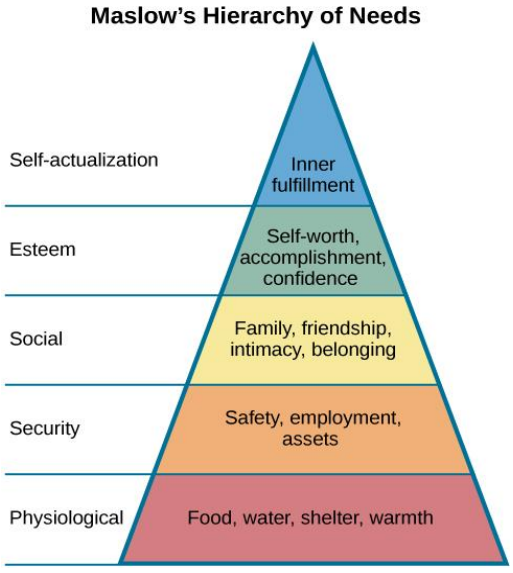

Figure 2. Maslow's Hierarchy of Needs [7]

Maslow stated that people are born with desire to self-actualize, a goal that can be achieved after meeting the needs at the lower levels.

The first level needs are those which are vital for survival. These needs include basic needs such as food, water, sexual satisfaction, clothing, sleep and air. These needs lie at the bottom of the hierarchy because they have priority over other needs and must be satisfied to the required extent. Without satisfying them to the required extent other needs will never motivate a person. For example, a hungry person will not think about anything other than his hunger and food. Maslow expressed it as, *'man lives by bread alone,'* when there is no bread. Physiological needs only lose their motivating potential after being satisfied.

According to Maslow, if the physiological needs are relatively satisfied then a new set of needs known as safety needs will emerge. These needs include security, stability, protection, freedom from fear and so on). The second level of needs are connected to psychological fear of one's health, job security and any hazard.

The third level are love and belonging or social needs. Here human behavior is driven by emotional relationships and the needs include friendship, family, intimacy, and sense of connection.

The fourth level needs are esteem needs where people need appreciation and respect. Here people are interested in accomplishing things so that they are recognized. According to Maslow, satisfaction of self-esteem needs leads to the feeling of self-confidence, worth, adequacy, strength, and capability.

The fifth level of the needs are the self-actualization needs where people are interested in fulfilling their potential. Maslow describe it as, *'to become everything that one is capable of becoming'*.

To conclude, Maslow's hierarchy of needs is still relevant in modern society if viewed as a guide to our numerous demands regardless of the order they will be addressed [8].

Critical Review

There are people who wants to satisfy esteem needs even before physiological needs. For example, there are people who prefer meeting security needs first before basic needs like building a house. Furthermore, there are people who do not care about other needs so long as their lower needs are satisfied.

Maslow reached conclusion on the characteristics of self-actualized person by studying biographies of 18 educated men who were all white men. His sample was unrealistic and hence, it is difficult to generalize the results.

Implications to Organizations

Organizations can use Maslow's Theory of Hierarchical Needs to plan better for staff retention. Understanding physiological needs help the managers to acknowledge the fact that any hungry or thirsty employee will hardly be able to make much of any contribution. Safety needs inform managers to plan for a working environment which is free from harm. Organizations can learn to meet the social needs of their employees by organizing retreats and picnics.

Herzberg's Two-Factor Theory

The theory was developed by Herzberg's from after conducting a research involving a group of 200 engineers and accountants in 1950s. The purpose of the research was to identify different attitudes at the workplace and their causes. According to the theory workplace satisfaction and dissatisfaction are caused by two mutually exclusive factors known as hygiene and motivator factors.

According to Herzberg, hygiene factors (dissatisfiers) extrinsic to the job and function and cannot motivate employees but rather minimize dissatisfaction. These factors include salary, interpersonal relations, company policies, supervision and working conditions. According to the theory, the presence of hygiene factors does not motivate employees, but their absence causes dissatisfaction. On the other

hand, motivators (satisfiers) satisfy an employee and they include work itself, responsibility, achievement, recognition, and advancement. They fulfil employee's intrinsic needs [9].

Out of the theory also grew out a technique which is referred to as 'job-enrichment which involved the inclusion of motivator factors in the job design.

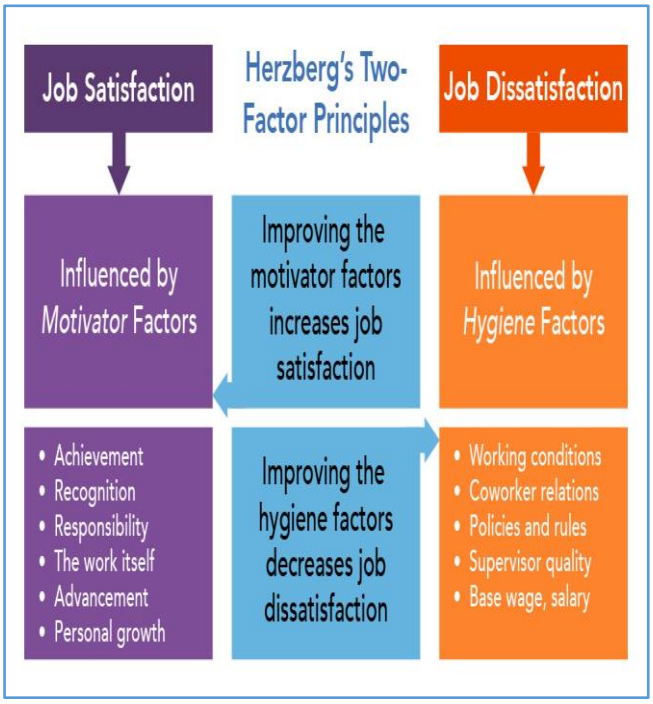

Figure 3. Motivator and Hygiene factors [9]

In [10], Dartey & Amoako conducted a study to understand essential factors advanced by Herzberg's two-factor theory that motivate Ghanaian workers. They found out that motivator factors indeed increased satisfaction of the workers and that workers rate motivator factors higher than the hygiene factors in the work setting.

In [11], Nanayakkara and Dayarathna carried out a study to identify factors which affect turnover intention of non-executive level employees in Colombo, Sri Lanka using a structured questionnaire, by applying Herzberg's Two Factor Theory of Motivation. The study found out that hygiene factors were found to be more affective for the turnover intention than motivators.

The Theory distinguishes between hygiene factors and motivators, hence providing valuable insights for organizations aiming to reduce employee turnover intentions. When organizations address both hygiene factors and motivators, they will be able to foster more employee engagement, hence staff retention.

Critical Review

Although the theory offers several valuable insights for managers, it has the following weaknesses:

The theory cannot be generalized to all kinds of job as it applies only to white collar jobs. He developed the theory after interviewing 200 engineers and accountants.

The theory is limited in its applicability because was developed based on research conducted United States. Different cultures have different ways of periodizing either hygiene or motivating factors.

The theory ignored the role played by other factors such as personality, age to mention but few in employee motivation.

Implications to Organizations

By understanding Herzberg's Two-Factor Theory, managers of organizations will be able

to look inwardly to establish the causes of turnover in the light of motivation and hygiene factors. They should eliminate job dissatisfaction and ensure job satisfaction by addressing hygiene and motivator factors.

To address hygiene factors managers should ensure fair and rational salary structure, improve the working environment, encourage good working relationships and make sure employees are secure in their jobs.

Managers should address motivating factors in the workplace to increase job satisfaction and ultimately, employee retention. More specifically, if managers plan to increase job satisfaction, they should address the motivator factors by providing opportunities for employee career growth, rewarding employees who have accomplished major tasks, and offering opportunities for the employee career development.,

Theory of Organizational Equilibrium

The Theory of Organizational Equilibrium is the first formal structured theory on employee turnover and retention [12]. The theory argues that an employee will continue to work if their perceived contribution to the organization is commensurate to the organization's perceived contribution. Organizations offer inducements while employees offer their services. Inducements refer to what an organization offers such as wages, services, and so on.

According to the theory, when both employers and employees feel they are getting value from their exchange, then an equilibrium is said to have been attained. Increasing inducements can lower employee tendency to leave. However, the inducement-contribution balance can be affected by two primary forces determining the decision to quit: the desirability of movement and the ease of movement. The perceived desirability of movement decreases when the level of job satisfaction is increased by an organization.

When an employee is not satisfied, he/she may seek the possibility of an intraorganizational transfer. When there is possibility of intraorganizational transfer, the employee is less likely to leave.

The perceived ease of movement is determined by the availability of alternative jobs. According to the theory, the greater the perceived number of alternative jobs, the higher the perceived ease of movement.

Critical Review

The theory assumes that increase in inducements lower turnover intention. However, this assumption is not true because there are many factors that determine job satisfaction. For example, an employee may opt to leave an organization due to stress.

Secondly, the theory has ignored other factors that cause turnover such as working conditions, leadership style and stress.

Implication to Organizations

The theory implies when an organization maintains an equilibrium between staff contributions and 0rganization inducements, no employee would leave.

Managers should use the theory on organization equilibrium as a diagnosis tool to understand why their employees leave. The findings will help them to design appropriate retention strategies.

For example, organizations should offer opportunities for intraorganizational transfers to the employees.

Job Embeddedness Theory

Job embeddedness theory, as introduced by [13], helps to explain why some employees are less likely to quit. The theory was developed over ten years of research carried out by Brooks C. Holtom and his colleagues. According to the Theory, an employee has series of connections in his/he life. An employee that has wide job-related roles, responsibilities, and relationships has more connections and hence more job embedded. Likewise, an employee with less job-related roles, responsibilities, and relationships

has less connections and hence low job embeddedness.

According to the theory, the level of connections of an employee are indicated by three elements: the fit (compatibility or comfort derived from how an employee's work relates to his/her skills, values, and goals), the links (how an employee is connected to organization and other people) and sacrifice (the psychological and material loss an employee will experience if he leaves the job). These levels of connections are sometimes known as influences which determines an employee's intention to stay on the job. Understanding the three critical elements (fit, link and sacrifice) enables organizations to assess the extent employees are at risk of quitting an organization.

Organizations should organize training sessions for the employees to increase their element of fitness. To increase links, opportunities to develop employee's cohesion such as encouragement of positive interactions should be provided. To increase the level of sacrifice, organizations should increase the perception of value of organizational benefits.

From the discussions above the dimensions of job embeddedness include both job-related and non-job-related aspects. Job-related aspects tie them to their jobs while the other aspects are for personal life and the community and tie them to a given location.

Implication to Organizations

Managers should embrace the Job-Embeddedness theory by focusing on the three aspects of the employee-organization relationship. The three aspects are link, fit and sacrifice.

To help build links between the team members, managers should encourage activities that bring the members together such as celebration of key events, encourage open communication and hold regular meetings.

To address fit, managers should ensure that each member's roles are in line with their strengths and skills. The manager can also meet each team member to understand their career goals and guide them accordingly.

In [14], Cynthia carried out a study to investigate on-the job and off-the job embeddedness and its dimensions of links, fit, and sacrifice to determine effects on math teacher turnover intention. He collected from 152 high school math teachers from 17 counties in a western U.S. state using the Job Embeddedness Questionnaire and a demographic survey. The results indicated statistically significant relationships between turnover intention and the sacrifice/job and turnover intention and links/community.

Managers should ensure a good working environment and minimize work stress to address the critical element of sacrifice. The manager should appreciate the work of the team members.

The Leader-Member Exchange (LMX) Theory

The study on how leaders relate with their followers has been an important area of research for many years [15].

Prior to the 1970s, most research studies were on the assumption that leaders behave in the same way to their followers. However, in 1975, Dansereau, Graen and Haga argued that leaders do not manage their followers using the same style, but instead develop unique relationships with different employees. Therefore, this theory explains the nature of relationships leaders have with their followers and the impact. According to the Leader-member-exchange (LMX) theory, leaders end up creating in-groups and out-groups due to limited time and resources. The in-groups enjoy high-quality exchanges while the out-groups have low-quality exchanges characterized by less trust, respect, and obligation.

The leadership exchanges developed between both the leader and followers will benefit both. Effective outcomes will be realized in a relationship characterized by a high level of respect, mutual trust, obligation, and respect.

This two-way relationship-based approach to leadership explains the nature of the leader's relationship and team members of the different groups under him. LMX theory sheds light on the potential of leaders to develop quality teamwork which eventually increase productivity in organizations. These relationships between leaders and their followers influence various attitudes and behaviors [16].

According to [17], there are three stages during the formation of relationships. The stages include role taking in which the leader evaluates the abilities and talents of the members while the follower starts to develop relationship with the manager; role making where the followers and leaders are involved in unstructured and informal negotiations and role routinization where there is routine.

What defines a leader is the consequence of the relationship between him/her and the followers and hence leaders should build good relationships across the team so that there is mutual trust and respect. This is important for the wellbeing and effectiveness of the employees. Knowledge on LMX theory can practically be used to improve relationships between leaders and their followers to promote better performance at work [18].

Critical Review

Although considered a robust explanatory theory as it describes the role of quality relationships between leaders and followers, and it's valid and practical approach, the LMX theory has limitations. First, the LMX theory is not fair because it makes a distinction between in-group and out-group which may lead to unhealthy competition.

Secondly, LMX theory tend to focus more on the nature of the relationship rather than the why or how of the relationship. organizations, which can lead to favoritism and inequality.

Implications to Organizations

Managers should be aware that the quality of leader-member relationship has bearing on the member's turnover intention, performance, job satisfaction and organizational commitment.

As stipulated in the theory, creation of in-groups and out-groups can have negative consequences especially for the out-groups. Therefore, managers should re-evaluate out-group members and give them a chance to improve while giving them the necessary support. This enables him/her to transition from out-group to in-group.

Social Exchange Theory

Social Exchange theory was founded by George C. Homans identified the concept in 1958 and other figures such as John Thibaut, Harold Kelley, and Peter Blau developed it [19].

Since many scholars were involved in the development of the theory, it has been applied in social situations such as television viewing, politics, decisions to terminate romantic relationships, organizational management, consumer buying decisions, and marriage [20].

Social Exchange theory is a concept that uses psychological and economic principles, like maximizing profit and minimizing costs or punishment to determine the success or failure of relationship [21]. Central to Social Exchange Theory is the idea that people engage in social interactions to maximize rewards and minimize costs. Rewards can include resources, enjoyment, emotional support, and companionship. Costs include time, sacrifices, emotional stress, and effort [22]. After people have evaluated their relationship and analyzed the benefits they might obtain, then they make decisions by comparing alternatives.

According to Social Exchange Theory a person's behavior is the consequence of a cost-benefit analysis. A behavior is likely to be exhibited again when it yields greater rewards than costs. According to theory, the greater the rewards and the fewer the costs, the greater the profit a person gains from the relationship.

The theory identified two components that every relationship has- costs and rewards/benefits. The costs are those elements of

a relationship which has negative value to the person. Rewards/benefits are those elements which have positive value to the person [23].

Homans put it as follows:

"Social behavior is an exchange of goods, material goods, but also non-material ones, such as the symbols of approval or prestige. Persons that give much to others try to get much from them, and persons that get much from others are under pressure to give much to them".

According to Holman people choose relationships that cost them less and provide them with more rewards. He came up with the following propositions to summarize social behavior system:

"Success Proposition: People are more likely to repeat their actions when they find that they are getting benefits or rewards for their actions.

Stimulus Proposition: If the person is being rewarded more often for any particular action or stimulus then he/she is likely to respond more often to that action or stimulus.

Deprivation-Satiation Proposition: If the person is receiving the same rewards, again and again, that reward tends to become less valuable for that person".

Thibaut and Kelley have put forward two categories of assumptions when it comes to social exchange theory [24].

Assumptions of Social Exchange Theory

Table 1. Categories of Assumptions [27]

Assumptions based on human nature	**Assumptions based on nature of human relationships**
As rational beings, humans like rewards and avoid punishments.	Relationships are interdependent and function as a process.
Humans evaluate costs and rewards using standards that change over time and vary person to person.	

Therefore, the theory assumes that relationships continue when the benefits outweigh the costs for those involved.

At organization level is level, employee do cost and benefit analysis of the relationships. If the relationship is not so rewarding, they will begin to survey potential alternatives and do cost and benefit analysis of the alternatives to determine if they are better [25]. Therefore, positive relationships are said to be happening when the benefits are greater than the cost. If the cost of the relationship is greater than the benefit, the relationship is abandoned.

Using social exchange theory as a theoretical framework, [26] conducted a study to explore the relationship between social capital and the failure or success of entrepreneurs who own businesses in Beckley, West Virginia. The study found out that application of social exchanges by entrepreneurs increased the longevity of small businesses.

Examining the applicability of social exchange theory to the practice of social work administration in hospitals, [27] analyzed the relationship between the social work director's contributions to other subunit chiefs in the hospital and returns to the social work department in the form of allocation of resources and increased opportunities for collaboration. The study found out that social exchange theory was useful to hospital social work administration.

Critical Review

Although Social exchange theory can be applied to many situations, it has the following limitations:

First, the theory is overly simplistic because there are many more factors to consider before people terminate a relationship.

Secondly, the theory assumes that relationships are abandoned in favor of alternatives. Therefore, it has failed to account for people who leave relationships although they have no alternatives. Moreover, there are people who persist in the relationship despite undesirable costs.

Third, the theory assumes that relationships are linear and yet they can progress, retreat, skip stages, or repeat certain stages.

Implications

Managers of organizations should be aware that there are always alternative jobs for which the employee can opt for if they are dissatisfied.

They should be aware that employees are looking for rewards within the relationship. They should make their relationships rewarding and minimize the cost to the employees to address staff turnover.

Discussions

Six employee turnover intention theories were critically reviewed and analyzed.

Maslow's theory identified different physiological and psychological human needs in hierarchical order that must be met to motivate an employee. The theory can be applied by modern managers to design programs to address the different needs of employees to minimize turnover intentions. Key needs include career development opportunities, compensation and benefits and recognition.

Herzberg's motivation-hygiene theory revealed two factors in an organization, namely, those that contribute to job satisfaction, also known as "motivation factors" and those that contribute to job dissatisfaction, also known as "hygiene factors". The implication for the managers is that both factors should be addressed to avoid staff turnover. For example, organizations should address Hygiene factors which include pay, company policies and administrative policies fringe benefits, physical working conditions, status, interpersonal relations, and job security. The organization should also address motivational factors that yield positive satisfaction such as: promotion opportunities, opportunities for personal growth, recognition, responsibility, and achievement.

The theory of organizational equilibrium explains the need for an organization to be able to attract sufficient contributions from its employees and its ability to offer commensurate incentives so that it can survive. If such mutual benefits are maintained, then employee turnover is minimized. Managers should increase employee satisfaction to decrease their perceived desirability to leave.

Job embeddedness theory helps an organization to discover why employees stay in an organization and why others leave. According to this theory employees that are embedded within an organization are less likely to leave. Embedment can only happen if interconnections between the employee, others in the organization, and the organization's larger network is addressed and if the employees are well suited to the roles. Job embedment also happens when conditions at the organizations are designed in such a way that it would be difficult for them to leave due to the loss that they would encounter. Organizations should make sure they have programs to encourage staff to stay. For example, organizations may develop programs that aim to develop cohesion and positive interactions at all levels.

According to Social Exchange theory, people weigh the potential benefits and risks of their social relationships. When the risks outweigh the rewards, they will abandon the relationship. Therefore, the purpose of the exchange is to maximize benefits and minimize costs. Employees weigh the value of what they receive (inducement) from the organization with their contributions. If the value of what they contribute is more than what they receive, they will start looking for alternatives. According to this Theory, turnover intentions is because of

non-compliance to the agreed rules by either the management or the staff. Therefore, managers should improve their relationships with the employees by providing attractive inducements. They should be aware that there are alternative jobs outside their organizations that their staff are more likely to consider joining if the inducements are not commensurate to what they contribute.

Leader Member Exchange (LMX) Theory sheds lighter on relationships between leaders and their followers and how the quality of such relationships influences various attitudes and behaviors in an organization. The knowledge on LMX theory can practically be used to improve the relationship between leaders and members and promote better performance at work and minimize staff turnover.

Each of the theories on employee turnover intention is important in guiding research on employee turnover intention and hence sources for theoretical framework. Each provides an insight to managers to design appropriate programs to motivate staff to minimize turnover.

Finally, the different employee turnover theories have emerged in different periods, and each has both strengths and weaknesses.

Conclusion

Six theories on voluntary turnover intention were reviewed and their implications on national organizations in South Sudan were also stated. The key findings under each theory are as follows:

Maslow's hierarchy of needs represents five key human needs that drive human behavior. The needs are mapped onto a pyramid diagram with each occupying a different level. The first level needs are food, water, sex, warmth, shelter, and sleep.

The second level needs are safety needs, the third level needs are love and belonging needs, the fourth level needs are esteem needs (respect, recognition, self-worth, and dignity) and the fifth need is self-actualization which occupies the highest need on Maslow's pyramid. According to Maslow, the lower-level needs must be met first before those at the higher levels. At the organization level, managers use Maslow's hierarchy of needs to design staff retention strategies.

The two-factor theory argues that there are separate sets of mutually exclusive factors in the workplace that either cause job satisfaction or dissatisfaction. The set of factors that cause satisfaction are known as motivator factors and they include career advancement, the work itself and recognition. The factors which decrease job dissatisfaction are called hygiene factors. Hygiene factors are extrinsic to the job function. They include salary, relationship with supervisors, company policies and working conditions.

Organizational equilibrium theory holds that employees make contributions to the organization in exchange for inducements. Equilibrium is attained when the employees feel that the value of the inducements equals the value of their contribution. At the level of an organization, employees are more likely to leave if they perceive that the inducements, they receive are not commensurate with their contributions.

Job Embeddedness Theory argues that when an employee is more embedded within their organization, they are less likely to quit. To get embedded employees should be suited to their roles (fit), they should be well-motivated so that it will be difficult for them to leave due to the loss they would experience if they left (sacrifice). Finally, employees should be connected to the organization and other people.

Leader-member exchange (LMX) theory is a concept that focusses on the relationship between a leader and his/her followers. Having a high-quality relationship between a leader and his followers increases the team members' job-related well-being and effectiveness.

According to the theory the relationship between a leader and team members goes through three stages (role-taking, role-making, and routine) during which in-groups and out-

groups are formed. The team members that prove themselves loyal, trustworthy, and skilled are put into the In-Group while those that prove incompetent are put in the out-group.

Social Exchange theory argues that people evaluate their relationship by analyzing the benefits they might obtain, then they make decisions by comparing alternatives. People will only exhibit a behavior when it yields greater rewards than costs.

At the organization level, if the relationship is not so rewarding, employees will begin to survey potential alternatives and do cost-benefit analysis to determine if the alternatives are better. If the alternatives are better the employees will quit.

Conflict of Interest

I do certify that I have no affiliation with or involvement or any personal relationship with any of the directors of the Publishing House or any entity with financial interest.

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