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Strengths and Challenges to the Integration of Mental Health Services into the Primary Health Care System in Developing Countries: A Systematic Review

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Abstract

The existence of a treatment gap for persons with mental disorders has led the WHO to implore leaders around the world to integrate mental health services into the community or primary health care system. Whilst there are strengths, there are great challenges to the integration process that are hindering the implementation of this initiative in developing countries. The aim of this paper is to synthesize evidence from various researchers regarding the strengths and challenges to the integration of mental health services into the primary or community health care system in developing countries. The sources of information included Pubmed, Medline, Google Scholar, Ebsco Host, and the WHO website. Seventeen (17) studies met the inclusion criteria out of the search results of 2,200. The challenges most reported were inadequate support and supervision structures; lack of key resources, limited Knowledge, inadequate training, and lack of experience of healthcare providers in mental health; time constraints for the primary healthcare workers; lack of regulatory measures to encourage the integration. The strengths most reported were health care workers' acceptance of responsibility to provide mental health services in the community setting. This paper has proven a number of strengths and challenges regarding the integration of mental health services into the primary or community health care system. It is hoped that this paper will assist stakeholders and policymakers in overcoming the majority of the challenges identified in the integration of mental health services in the primary health care system.

Keywords*: Challenges, Developing countries, Integration, Mental health services, Primary health care, Strengths.*

Introduction

Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" [1]. With this definition at the forefront, it is imperative that health care workers, including those involved in primary health care or community-based settings, have a more integral role in ensuring every aspect of an individual's health is maintained at an optimal level. Mental illness is growing to be a public health issue in developing and developed countries and accounts for approximately 14% of the global burden of the disease [2]. It is therefore of great importance that screening, identification and treatment of mental health conditions in primary health care systems be addressed since it is the first point of contact for most persons in their community.

More than 85% of the world's population live in low- and middle-income countries, and more than 80% of persons with mental disorders live in these countries [3]. The integration of mental health services into the primary health care system has been identified as one of the best ways to reduce the number of admissions and readmission of patients with mental illness into psychiatric hospitals. With the emergence of

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outbreaks of communicable diseases such as Covid 19, which require long periods of isolation, there has been an increasing number of persons affected with mental health conditions, including depression. According to WHO [4], there has been a rise in suicidal mortality, as much as 800,000 per year. It has been indicated that people with mental health disorders have a higher mortality rate and are more prone to developing physiological health problems such as cancer and HIV infection [5]. This can increase the global burden on the health care system since it will also cause a negative economic impact.

The World Health Organization has put out the mandate to integrate mental health into the primary health care system and has highlighted reasons for doing so. These reasons are as follows: "the burden of mental disorders is great; mental and physical health problems are interwoven; the treatment gap for mental health disorders is enormous; primary care for mental health enhances access; primary care for mental health promotes respect of human rights; primary care for mental health is affordable and cost effective and primary care for mental health generates good health outcomes" [6]. "Health systems have not yet adequately responded to the burden of mental disorders; as a consequence, the gap between the need for treatment and its provision is large all over the world" [7]. Integrating mental health services into primary health care (PHC) is among the most viable means of closing the treatment gap and ensuring that people get the mental health care they need [8]. Since the declaration of the need for integration of mental health services into primary health care or general health services, research has highlighted strengths and challenges for both developed and developing countries.

This article aims to identify the strengths and challenges of the integration of mental health services into the primary health care or community-based health care systems in developing countries. Studies conducted in Mexico, Ethiopia, Uganda, Jamaica, Nepal, Pakistan, South Africa, Nigeria, China, India, and Brazil were included in this review with the hope to alleviate some of the challenges and improve the services offered to the populations in developing countries.

Methods

The aim of this study is to identify the strengths and challenges of the integration of mental health services into the primary health care or community-based healthcare systems in developing countries. This is in an effort to decrease the treatment gap of mentally ill patients and to improve their overall health outcomes. It was decided that literature within the time frame of no more than ten (10) years will be used for this review, given the breadth of literature relating to the integration of mental health services into the primary health care system. The following databases were searched: Medline, google scholar and Ebsco host. Keywords were used to develop the search strategy. The selection of articles was based on the event of interest, which is the integration of mental health care into the primary health care services; the population used must include the policy makers and other stake holders such as the doctors, nurses and other healthcare providers, patients, and family members. The review covered three types of research: qualitative, quantitative, and mixed methods. The characteristics of the study were based on the author, the year the article was published, the study type, the setting, the country in which the research was done, the population and the challenges and the strengths of the integration of mental health in the primary care system. The following articles were excluded: articles older than 10 years; were not specific to the primary or community health care setting, were not in English and were not specific to developing countries. The data was synthesized combining the different methods of study (qualitative, quantitative, and mixed methods) (See Table 2).

Results

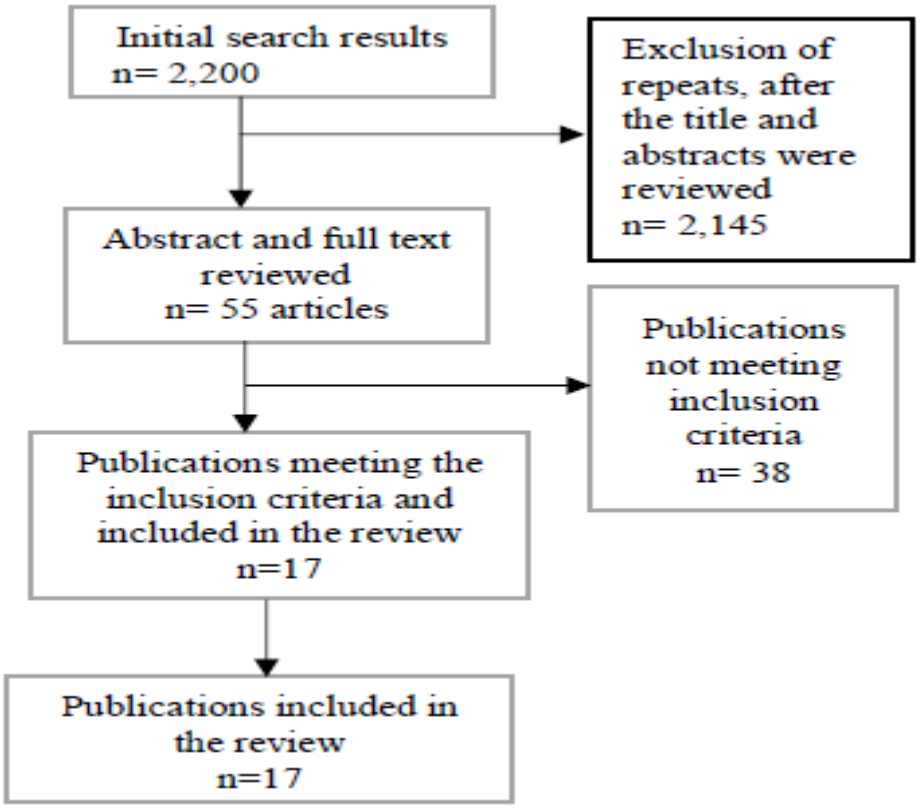

Figure 1. Search Results and Flow Chart of Article Selection

A total of 2,200 articles was yielded through the systematic search of the literature. 2,183 papers were excluded from the study due to year of publication, repetition, type of research. Some were theoretical reviews or were not referring specifically to the strengths and challenges of the integration of mental health services into the primary health care system. Seventeen (17) articles were included in this study; four (4) quantitative, eleven (11) qualitative and two (2) mixed methods. The results of the studies were organized in Table 2 by the type of study and included the sample size, country, aim of the study, methodology and main results.

Table 1. Inclusion and Exclusion Criteria of Articles used in Review

Inclusion Criteria	**Exclusion Criteria**
1. Primary research	1. Theoretical/systematic reviews
2. Articles 10 years old and under.	2. Articles over 10 years of age.
3. Published in recognized medical or scientific journals	3. Articles that did not focus on the integration of mental health services in the primary or community health care system.
4. Used qualitative, quantitative, or mixed methods	4. Articles not written in English.
5. Articles are written in English	5. Articles that focus on developed countries.
6. Articles related to strengths and challenges of the integration of mental	-

health services into the primary or community health care system.	
7. Articles that focused on developing countries (low- or middle-income countries).	-

Strengths of the Integration Process

The majority of the articles included in the systematic review identified common strengths and challenges to the integration of mental health care services into the primary health care system. The major strength identified by the studies were the willingness of health care workers to offer the mental health services into the primary healthcare services or they agreed that it is important to integrate mental health services into the primary healthcare service since it will improve the health outcome of the affected persons. [9] in a study conducted in Ethiopia reported that the strength within the system regarding integration of mental health services was that most primary health workers stated that mental health care was important and they were interested in delivering the care. [10] did a study in Pakistan and also highlighted that there was support amongst all stakeholders for the integration of mental health services in the primary health care system. Athie et al., [11] in their research on the perceptions of health managers and professionals about mental health and primary care integration, also indicated that both groups were accepting of mental health services in primary health care services.

However, there were some studies that indicated other strengths in their system. Hanlon [12] conducted a study in Ethiopia. The participants were national and regional policymakers, planners, and service developers. It was highlighted that the strengths of the integration process were government support and the presence of a mental health strategy.

In another study conducted in Ethiopia, it was indicated that the strength of the integration process was the presence of the necessary medications to treat epilepsy, psychosis, and depression [13]. The majority of cases that were identified at the time were epilepsy and psychosis. According to [8], the strength identified by the Primary care providers in Uganda was their awareness that if they followed the Uganda clinical guidelines, they would be able to provide better care to the patients.

Challenges of the Integration Process

Hanlon [12] stated the following as challenges faced by Ethiopia in the integration of mental health services into the primary health care system: a low level of awareness regarding mental health; inadequate health information system; stigmatization attitudes; inadequate system of supervising and monitoring primary health care workers; low levels of Knowledge. [13] conducted a study in Jamaica that highlights that stigmatization can also be a barrier to the integration process. They indicated that due to more public awareness programmes, more persons were more kind to the people with a mental disorder, indicating that the high level of stigmatization may be due to a lack of Knowledge among the community.

Their research [2] conducted in Ethiopia identified that the major challenges that existed were the "delayed support and supervisions, staff turnover, interrupted supply of drugs and shortage of budget". [9] identified challenges in South-west Ethiopia. These challenges included poor knowledge level amongst the primary health care workers in regard to diagnosis, symptoms and treatment of mental disorders. Other challenges that existed were "health system and structural issues such as poor medication supply, lack of rooms, time

constraints, absence of specialist supervision and lack of treatment guidelines".

Their study [14] done in Uganda gathered information from twenty primary health care providers. The constraints to the integration of mental health services into the primary health care service that were reported by them included problems in regard to the patient flow processes, inadequate human resources, inadequate facilities in regard to the supply of medication, supplies and equipment to effectively carry out their work; the presence of gender related factors as female workers felt uncomfortable and unsafe caring for male patients with mental disorders or for an aggressive patient. They further stated that the training was inadequate since it did not have a practical component to it; there were also challenges in the accessibility of care for the patients which was due mainly to financial constraints or lack of support. [8] also highlighted challenges that were present in Uganda. These included: the health provider's inadequate Knowledge of mental disorders; discomfort in making new diagnoses for the patient with a mental disorder as they were fearful that they would get it wrong; they felt it was burdensome to use the guidelines provided; lack of a trained mental health specialist to provide support, consultation, or supervision; lack of motivation to screen for mental health disorders.

Wakida [14] engaged in a further study in Uganda to assess the feasibility and acceptability of educational intervention through the use of the guidelines. It was determined by the health care providers that having simple and available guidelines, a health information system that allows for the inclusion of mental health disorders and training and support supervision would promote success in the integration of mental health services in the primary health care system. Ayano [15] carried out a pre and post-test intervention study in Ethiopia to determine its implication for the success of mental health integration into primary health care. This study identified that there was a knowledge deficit, negative attitude, and inadequacy in the practice of the primary health care worker's pretest. At post-test, all three areas showed a significant difference indicating the importance of training of the workers for success of the integration process. [16] also conducted a quasi-experimental study to evaluate a mental health training course for primary health care workers in Nigeria. This too, indicated that training positively impacted the management of the patients with mental health disorders. The Primary health care workers exhibited an increase in Knowledge and improved practice.

A study was conducted in Kenya, and the challenges to the integration of mental health delivery into its primary health care system were highlighted [17]. The challenges identified by the workers through two focus group discussions were: the stigmatization of people with mental disorders due to poor knowledge levels by the persons in the community and their beliefs. High workload due to the high number of persons that visit the health centers making it difficult for the health care workers to adequately care for persons with mental disorders. There is inadequate supervision by trained mental health specialists. Patients attend multiple facilities, which make continuity of care and follow up difficult. Inadequate supply or lack of appropriate medication makes treatment difficult. A poor health information system that does not capture the mental health disorders. There is a need for continuous training, supervision and support for the primary health care workers and a lack of resources.

In their research [18] in Nepal noted the perception of service users and the caregivers on primary care-based mental health services. The major challenges identified in this study were as follows: frequent turnover of trained health workers, inadequate or unavailability of medication, lack of space for consultation and counselling; stigmatization and discriminating behaviour of some health workers; unavailability of the same health worker at follow-ups.

Although [10] reported support by all stakeholders for the integration of mental health services into the primary health care service in Pakistan, there were also some challenges listed in the article. Perceived lack of support, non-acceptance from the community, lack of human resources, some staff may not be willing to accept the additional workload since they already felt burdened are a few identified. [19] indicated in their study conducted in Pakistan that there was mixed attitude amongst primary health care physicians which can affect the care provided. Additional challenges from the study were while the participants were knowledgeable about the mental disorders, they had limited knowledge about the medications used in the management of these disorders. Time constraints for the physician were also a barrier noted, as well as a lack of awareness by the patients. Findings from a study done in India by [20] in which the participants were doctors indicated that there were some negative attitudes toward mentally ill patients. Some of the doctors never received any mental health training and while most were able to identify depression and psychosis in a vignette, most were unable to provide three signs and symptoms of depression and psychosis.

Their study [21] done in six low-and-middle-income countries identified poor governance as a major barrier. Other barriers included a lack of a bill or law to protect the mentally ill, or there was no implementation of it; mental health was viewed as not being a priority even though there may be a new or draft policy in place. The presence of stigma was evident in all countries. Health workers in some countries felt that the offering of mental health services was extra work and time-consuming. There were a lack of trained mental health workers and other primary health care staff, inadequate funding, weak health information systems to include mental health disorders and poor accessibility due to factors such as geographical area.

Martinez [22] conducted a study in Mexico City to determine what are the barriers to integrating mental health services in the community. The participants were 25 clinical or administrative staff from the community-based health care system. Some of the challenges identified in the study were inadequate funding, lack of knowledge on the part of the people in the community, shortage of human and material resources; time constraints for the health care workers; stigmatization; inadequate supply of necessary medications to treat the mental disorder and lack of mental health training.

Discussion

This systematic review was done with the aim of highlighting the strengths and challenges that exist in developing countries regarding the integration of mental health services into the primary health care system. The studies reviewed have similar results in most cases and indicate that the integration of mental health services is still not where it needs to be at this time. Without integration, the treatment gap will continue to exist and result in negative health outcomes for persons affected by a mental disorder. The strength highlighted in the majority of the studies included in this paper is that primary health care providers recognize the importance of offering mental health services in the community setting. However, there are many challenges that have resulted thus far in the poor uptake or implementation of the integration policy. The common challenges identified were lack of Knowledge regarding mental health and its management, lack of public awareness resulting in stigmatization, discrimination by health care workers and members of the community, inadequate human and material resources, time constraints, financial constraints, inadequate supply of medication, frequent turnover of specialized staff, lack of a health information system that includes mental health disorders, inadequate supervision and monitoring of primary health care workers by the staff who specialized in mental health, inadequate accessibility, poor follow up and lack of policy or mental health plans.

Table 2. Summary of Articles which Highlighted the Strengths and Challenges of the Integration of Mental Health Services into the Primary or Community-based Health Care System in Developing Countries

Author	Sample size (n), Country	Aim	Materials and methods	Findings/Results
Qualitative studies				
Hickling et al., (2011)	159 participants; Jamaica.	To consider whether or not deinstitutionalization and the integration of community mental health with primary health care services have reduced stigma toward mental illness in Jamaica.	20 focus groups; Discussions were based on a standard guide of questions; each discussion lasted for approximately 2 hours. All the sessions were transcribed and recorded by court stenographers. The transcripts were coded using ATLAS.ti (version 5.0 qualitative data analysis software. Emergent themes and the ATLAS.ti data classifications were agreed upon by the authors.	The results indicated that custodial mental health institutions were determinants of stigmatization in Jamaica. The shift to deinstitutionalization or the integration of mental health services into the primary health care services has allowed some Jamaicans to view patients or persons with mental illness differently and they are more compassionate towards them. Although stigma still exists it has decreased since the integration of mental health services in the community health care system.
Hanlon et al., (2017)	17: 7 policy makers at national and regional level and 10 district health office administrators and facility heads; Southern Ethiopia.	To explore the barriers, facilitators, and potential strategies to promote good health system governance in relation to scale up of mental health care in Ethiopia.	In depth interviews, participants were purposively selected. The development of the topic guide and the analysis of the transcripts were based on a framework used for the assessment of the governance of the health system adapted for the Ethiopian context.	Strengths and weaknesses of health governance were identified. Strengths included: presence of high-level government support; a mental health strategy and there was a focus on integration of mental health services into the primary health care system. Weaknesses included low levels of awareness regarding mental health care planning, the levels of transparency about planning decisions, inadequate leadership, inadequate supplies of medication and health information system for monitoring of mental health; lack of supervision from specialist and mentoring of primary health care staff. there was the presence of stigmatization attitudes in the community, low levels of mobilization for mental

				health in the community and low levels of empowerment and Knowledge.
Petersen et al., 2017	141, Ethiopia, India, Nepal, Nigeria, South Africa, and Uganda.	To identify key governance challenges, needs and potential strategies that could facilitate adequate integration of mental health into primary health care settings in low- and middle- income countries.	An exploratory study. A descriptive qualitative approach was used. A framework analysis was also utilized. The sampling method was purposive. Participants were policy makers, provincial coordinators and planners in primary health care and mental health. Interview was the method used for data collection. Across country thematic coding framework was utilized to analyze data initially and each country had specific emergent themes added.	Challenges that emerged included poor governance; inadequate pre-service training; high staff turnover, mental health stigma; perception that mental health care was additional work; inadequate financing, problems with implementation of laws to protect the mentally ill; weak mental health information system; geographical barriers to accessing care poor quality assurance practices; unethical practice.
Wakida et al., 2019	7, Mbarara, Uganda	To assess the feasibility and acceptability of an educational intervention towards improvement of the Primary health Care Provider's uptake of the UCG in integrating mental health services into the PHC IN Mbarara district, southwestern Uganda.	A descriptive cross-sectional qualitative study. Participants included a clinical officer, nurses, a midwife. Data was gathered using a semi structured interview guide. Interviews were done in English and lasted for about 60-90 minutes long. Data were thematically analyzed with the use of Atlas.ti version 8.	Packaging of the guidelines were appreciated since it was more user friendly and accessible to assist in the treatment of persons with mental illness. Modification of registers to include mental disorders; training and support supervision were all welcomed by the participants since it assisted in overcoming challenges or barriers to the integration of mental health services into the primary health care process. Participants felt that the education should be repeated and regularized due to rapid turnover of staff.
Jenkins et al. (2013)	20 health workers from, Kenya	To evaluate the impact of a mental health training programme for primary care in Kenya.	Two ninety-minute focus groups comprising of ten health workers each were conducted. The health workers were nurses or clinical officers who had medical training for three years. The transcripts and recordings were analyzed in themes.	Challenges identified to the integration of mental health services were health workers indicating that it is an increase in workload, lack of supervision in regards to mental health; lack of medication for the mental health disorders; lack of resources both human and material; health management information system does not adequately allow for the recording of mental health disorders; the need

				for continuous training of health workers; the presence of stigma and discrimination amongst persons in the community. The mentally ill were considered to be demon possessed and taken to churches instead of the health centers unless displaying violent behaviors.
Wakida et. al, 2018	20 primary health care workers, Uganda	To explore the factors that are specifically affecting the ability of primary care providers in rural Mbarara district to integrate mental health services into the primary health care system.	A Semi structured interview guide was used to gather data. The guide was pilot tested to determine what changes may need to be made. Thematic analysis was used to analyze the data. The participants were nurses, midwives and clinical officers. No doctors were a part of the study. 17 health centers were the sampling frame.	Barriers identified included: The health workers had inadequate Knowledge about the mental disorders, their causes and how they are managed. They appeared to be comfortable managing patients with the same diagnosis rather than finding a new one; there is the absence of a senior to seek consultation when not sure about the mental condition. Inaccessibility of guidelines since there were limited availability of hard copies and it was also difficult to use. The level of importance of mental disorders was minimal when compared to other conditions. Lack of motivation to use the guidelines due to lack of sensitization, inadequate human resources. Lack of trained specialist in psychiatry.
				Facilitator: health workers' awareness that with the use if the UCG, they would provide better care and they would feel contented.
Wakida et al., 2019	20 primary health care workers, Uganda	To explore Uganda's health system constraints to the integration of mental health services into the health care system from the primary health care providers' perspective.	A Semi structured interview guide was used to gather data. The participants were nurses, midwives and clinical officers from six health districts. No doctors were a part of the study. 17 health centers were the sampling frame. Data thematically analyzed.	Key constraints identified by the primary care providers included: inadequate practical experience in mental health during training, patient flow processes needed improvement; limited accessibility to care due to factors such as financial constraints, distance and other social factors. Inadequate human resources. Gender related factors were identified as female health workers expressed fear in dealing with male patients or aggressive patients. Supply and distribution of necessary supplies and

				equipment to health centers was also of some concern.
Ayano et al., 2016	360 primary health care professionals, Ethiopia.	To assess the experiences, strengths and challenges of integrating mental health in primary health care in Ethiopia.	Facility based supervision in primary health care centers. Semi-structured and standardized WHO mental health global action programme support and supervision questionnaires were utilized to collect data. 360 participants over 180 health institutions.	The main challenges identified in the study were delayed support and supervision to primary health care staff, rapid staff turnover, there was an interrupted supply of drugs and a shortage of budget towards the integration process.
				Strengths: availability pf most psychiatric drugs, there is government leadership and political commitment, necessary policies and strategies are in place, more than 90% of health centers plan to give mental health service, increased number of staff is trained in mental health care cases and are identified and treated by trained professionals.
Luitel et al., (2020)	43 services users and 38 caregivers; Nepal.	To assess service users and care givers perceptions of mental health services provided by trained primary health care workers in Nepal.	The study was conducted in Chitwan, a district in Nepal, service users were selected purposively based on pre-defined criteria. All who were invited, participated in the study and they were all adults Semi structured interview schedules were used. A thematic anaysis approach was used to analyze the data Indexing and charting of the data was done using the QSR Nnivo 10 software.	Strength: Service users and care givers expressed satisfaction with the provision of mental health services offered by primary health providers. However, the study identified some challenges to the primary-based mental health services: frequency of the transfers of trained health workers, the unavailability of medications for treatment; and stigmatization and negative behavior of some health care workers.
Hussain et al. (2018)	15 decision making and implementation-level stakeholders which includes mental health and public health	To assess the views of key stakeholders about integration of mental health into Primary health care system in Karachi, Pakistan	In depth interviews, participants were from both public and private health institutions. A purposive sampling strategy was utilized. Data was analyzed using NVivo software, version 10	Barriers to the integration of mental health services into the primary health care system were identified. These included the lack of awareness of the community members; lack of political will and commitment; lack of resources (both capital, material and human); increased workload for the staff. Strength identified: participants of the study agreed that mental health is of great importance and are in favor of the integration of mental health

	professionals and primary care staff, Pakistan			services into the primary or community health care system.
Marinez et al., (2017)	25 primary health care providers; Mexico City	To understand the potential barriers to the integration of mental health services in primary health clinics in Mexico.	Semi-structured interviews were conducted to gather data from 25 staff members from 19 primary care clinics. Data were analyzed using the meaning categorization method. Data was coded, and emerging themes were established.	Barriers identified were: staff shortages, resources shortages, budgetary issues, lack of employee benefits, time constraints, appointment restrictions, poor health insurance coverage, language or cultural issues, presence of stigmatization, behavioral health treatment beliefs, low financial resources, Knowledge and information issues, inadequate medication; lack of training and Knowledge regarding mental health disorders.
Quantitative studies				
Rahman et al., 2019	150 primary care physicians; Rawalpindi, Pakistan	To determine the level of awareness regarding mental health disorders and their management among primary care physicians. To determine the attitude towards management of mental health disorders and identify the barriers in the system through them.	A cross sectional study using both public and private clinics/hospitals. Data was collected with the use of a structured questionnaire. Sample was selected using convenient sampling method. Data was entered in SPSS 24. Descriptive statistics was used to analyze the data and Chi-square test was applied.	Barriers identified among the Primary care physicians are: Lack of Knowledge particularly in regards to medication and limited time availability in the management of patients with mental disorders. Lack of awareness among patients, poor access due to distance from the health center, finance and appointment. The physicians had a mixed attitude.
Ayano et al., 2017	94 primary health care providers; Ethiopia.	To evaluate the effect of mental health training on the Knowledge, attitude and practice of primary health care workers in Ethiopia	A quasi experimental pre and post-test study design over a 3-month period was conducted. Psychiatric professionals carried out the intervention. The instrument was a self-completed questionnaire with 3 sections. The data was statistically analyzed. Paired sample t test and p values was performed to determine	Lack of Knowledge regarding mental disorders, negative attitudes and inadequate skills were identified as barriers to the integration of mental health services. There was significant improvement on post-test in the areas of Knowledge, attitudes and practice. This indicates that training has a significant effect on the success of integration of mental health services in the primary health care system. Strengths include:

			the difference between the pre- and post-test results.	availability of Medication; political commitment; most health institutions planned to offer mental health services; most health professionals planned to be trained.
Abera et al., 2014	151 primary health care workers; South West Ethiopia.	To assess the perceived challenges and opportunities of integration of mental health care into the primary health care from the perspective of primary health care workers in to Ethiopia.	A Cross sectional survey. 16 health centers were randomly selected out of 56 health centers. A structured self-completed questionnaire was used to collect data. Interviews were also conducted using semi-structured interview guide. Data analysis was done using the SPSS version 16 for windows. Qualitative data were coded and categorized using a thematic approach.	Challenges identified included: There is lack of clinical attachment in the training offered to health care workers. There is a low level of Knowledge and awareness amongst the health care workers on mental disorders. Unavailability of medication to treat mental disorders; lack of rooms for examination and privacy; health system and structural issues exist; time constraints to diagnose and treat persons with mental disorders; absence of specialist supervision; lack of treatment guidelines.
				Opportunities: health workers willingness to provide care and are in favor of integration of mental health care into the primary health care system. They see the importance of offering the service in the primary health care settings. Positive attitude exists amongst most health care workers.
Cowan et al., 2012	46 doctors; Karnataka, India	To examine the mental health-related Knowledge and attitudes of doctors providing Primary health care in a rural area of Karnataka, India	A self-administered questionnaire consisting of 4 parts to address demographics and practice, training in mental health, Knowledge of mental health and self-perceived competence, attitudes towards mental health. Analysis of data was done using SPSS version 18.0	The majority of participants felt competent in providing mental health services. Negative attitudes were reflected by their responses indicating the presence of stigmatization; almost 1/3 did not receive mental health training. Three-quarter of respondents correctly identified depression and psychosis however fewer were able to name 3 common signs and symptoms of depression and psychosis.
Mixed Methods				
Miguel-Esponda et al., 2020.	486 and 28, Chiapas, Mexico	To examine the implementation process and the outcomes of the Companeros En Salud	A mixed-methods convergent study design. Quantitative: all adults service user registered were included at the time of the study-486 patients.	Strengths and challenges identified included the following:
				Strengths: the health care providers engaged in capacity building activities; there was use of

		mental health programme and the extent to which mental health integration has been achieved. To identify the successes and challenges to allow for the development and implementation to inform the development of similar programmes.	Descriptive statistics were used to summarize sociodemographic data and clinical characteristics. Clinical notes were coded, means and proportions were calculated. Analyses were done in RStudio (Version 1.1.453). Qualitative data: convenient sampling method was used. 28 participants (12 medical doctors, 8 nurses, 4 clinical supervisors, the mental health programme coordinator, the maternal health coordinator, 2 organization directors). 2 focus groups and 24 structured interviews were conducted to collect data. The qualitative data analysis was done using framed analysis. Analysis was done in Spanish and converted to English.	guidelines to assist in diagnosing and treatment of patients; the primary health care providers were accepting to training and supervision related to mental health and there was strong motivation and commitment to delivering mental health services. The ability to deliver mental health services due to the availability of a mental health coordinator, availability of some material resources and capacity building mechanisms. Challenges included: inability to provide talk-based interventions; low levels of follow-up by service users, training, and supervision available were not fully appropriate for capacity building since there was a need for more on-site supervision. Time constraints did not allow for talk-based intervention, lack of specialists to provide mentorship, limitations in treating patients with complex symptoms due to lack of specialist services to be referred to.
Athie, et al., 2016	42: 18 health managers and 24 professionals; Rio de Janeiro, Brazil.	To analyze the perceptions of health professionals and managers about the integration of primary care and mental health.	A mixed-method cross sectional study. The sample comprised of all members of the mental health matrix support. A total of 42 health professionals. Data collection tool: a semi-structured questionnaire was developed to collect the data. It was comprised of 185 closed questions and one open ended question. Quantitative data was analyzed with SPSS statistical package software (version 17.0). Qualitative analysis was done based on framework analysis and thematic analysis methods.	Negative aspects/barriers identified include: Lack of Knowledge about different units, system structures and work processes; constraints regarding institutional processes; lack of human resources; frequent turnover of General practitioners; inadequate Knowledge regarding psychosocial interventions; low frequency of mental health matrix support in the community; continuity of care is not perceived as a health tenet. Benefits to integration include: Connecting primary and mental health services; planning care together; helping non specialists to manage mental health problems; improving access to mental health services.

A Study [23] postulated that in order for integration to be effectively implemented, there must be strategies in place that can strengthen the program.

Primary health care workers are the first point of contact in the health care system for most persons in the community, and it is therefore imperative that policymakers ensure that continuous training and education be promoted and provided for these healthcare workers. It is through the provision of education and training that the management of mental health patients can be effective and efficient. Ayano [15] confirmed this fact in their study conducted in Ethiopia. They recognized that there was a significant improvement in the Knowledge, attitude and practice of the primary health care providers after psychiatric professionals provided training. It must be noted, however, that this strategy must be continuous to ensure that it is not compromised by frequent staff turnover, which was also highlighted as one of the challenges in the integration process in developing countries.

Political will and commitment are key to the implementation of the integration process. According to WHO, [5] most countries are still injecting their resources into hospital services as opposed to the primary health care services despite the fact that the health outcome is generally poor. This indicates that Policymakers and stake holders must first understand and recognize the importance of the primary health care service to determine the necessary strategies that need to be taken which will result in positive health outcomes for persons affected with mental disorders.

Miguel-Esponda [23] indicated that strategies that will strengthen the system to implement integration include "adequate financing, ongoing capacity building, information systems to monitor progress, and ensuring adequate medication supply." Provision of adequate and appropriate medication; ongoing capacity building, provision of proper infrastructure; implementation of an efficient information system to monitor the progress of mental disorders; adequate and continuous training of primary health care workers in the care and management of patients with mental health disorders and the employment of a supervision and monitoring system are all hinged on the financial investments made by the government into the health care system. The reality is that if more finance is committed to the primary health care system, more can be done to prevent mental illness and adequately care for patients with mental health disorders. Accessibility to health care will be improved with the integration of mental health services in the general health services, especially in the primary health or community-based health care system.

Stigma and discrimination by health care workers and persons in the community have also been a great challenge for the integration process. This challenge has caused the mentally ill to fear seeking help from health care service providers and the administration of poor quality of health care. Myths and beliefs of members of the community and family members have also led to seeking help from persons offering unconventional forms of medicine. The patients are only taken to professional medical practitioners when they appear to be in a state of violence. To overcome this challenge, there must be more public awareness campaigns to assist persons of the society to have a better understanding of mental health disorders and relate with persons affected appropriately. Hickling [13] indicated that stigmatization was associated with institutionalization. Their study, however, proposed that deinstitutionalization and the integration of community mental health care have led to a decrease in stigmatization amongst the people in Jamaica.

The challenges of integration of mental health care into the general services are great, and there is a need for strong governance that will provide a significant measure of support to an improvement of mental health care. A study [12] stated that good health system governance is essential in ensuring that all other components of

the health system is functioning. This includes ensuring that policies and plans to address mental disorders or illness are addressed, and the mentally ill are protected and adequately cared for. Good governance will ensure that there is proper planning and coordination and efficiency and effectiveness of care for persons with mental disorder/illness. It is only with the dedication and support of all stakeholders and policy makers that the integration of mental health services into the primary health care system will be successful.

Nursing Implications

The information gained from this article has implications for nursing practice and the curriculum. Nurses are one of the first group of health workers that will be in contact with the members of the community it is therefore imperative that mental health nursing be a part of the nursing school's curriculum, which must have a meaningful clinical component to provide the necessary base for identification and care of persons affected by mental health disorders. The nursing department at the ministerial level needs to ensure that continuous education is in place at least twice yearly to help the nurses to be adequately equipped with the necessary knowledge and skills to provide holistic care. Nurses should also play a pivotal role in launching and providing public awareness programmes to help people in the community to become more aware of mental health disorders and what is the best line of care and treatment. This includes increasing the political will, which will inject a larger budget into health and allow for the health system to overcome the many challenges faced.

Conclusion

This study provided a synthesis of strengths and challenges that currently exists in the developing countries in regard to the integration of mental health services into primary health care system. Policy makers and stakeholders need to note these challenges and implement relevant strategies to overcome them and strengthen the facilitator that already exists. The implementation of the integration policy is necessary to close the treatment gap for persons with mental disorders, and it is important that it takes effect soon to improve the health outcome of those affected.

Limitations

Only articles published in English were used due to financial constraints to hire a translator. Only low- and middle-income countries were used; hence there is the possibility that I may have missed relevant information from studies carried out in developed countries.

Ethics Approval and Consent to Participate

Not applicable.

Conflict of Interest

There is no conflict of interest.

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The Effect of Acupuncture Using Specific Acupoints and Non-Acupoints in Non-Traumatic, Chronic Shoulder Pain: A Case Study

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Abstract

Chronic shoulder pain is one of the most common presentations of musculoskeletal pain in our community, which usually complicates or interferes with a person's daily activities, social events, and overall quality of life. It is the leading cause of disability among middle-aged working individuals. It has been reported that until the present day, none of the conventional treatments has proved effective for chronic shoulder pain in the long term. Furthermore, there are considerable side effects, to varying degrees of these treatments. Acupuncture, as part of Traditional Chinese Medicine, has shown effective results in treating shoulder pain by minimizing the pain and improving range of motion and mobility. The present case involves four patients diagnosed with non-traumatic chronic shoulder pain. All the patients were given three acupuncture treatments per week, lasting 40 minutes for the duration of two weeks. Needling was inserted at six specific acupoints and five specific non-acupoints. Pain and mobility assessments were done before and twenty minutes after each treatment. The result shows positive effects of acupuncture using specific acupoints and specific non-acupoints in alleviating non-traumatic chronic shoulder pain. At the end of this study, their shoulder pain was greatly minimized, and their shoulder functionality improved remarkably. Although larger clinical intervention studies on the effect of acupuncture treatment on chronic shoulder pain due to non-traumatic injury are needed, the result of this case study indicates that acupuncture treatment using specific acupoints and specific non-acupoints can be an effective alternative therapy or treatment tool for patients with non-traumatic chronic shoulder pain.

Keywords: *Acupuncture, Acupuncture points, Chronic shoulder pain, Conventional treatment, non-acupuncture points, non-traumatic shoulder pain, pain scale, range of motion and mobility.*

Introduction

Research shows that shoulder pain is one of the most common musculoskeletal pains in the community. It affects 6.9% to 26% of the population globally [1]. It is also a common musculoskeletal disorder, prompting many patients to seek medical treatment [2].

The shoulder is a multi-ligament, multi-tendon, multi-muscle joint. It is a complex and the most mobile joint in the body. This mobility provides the upper extremity with a tremendous range of motion [3]. Therefore, any of these tissues that sustain damage can cause pain and discomfort. Shoulder pain may be due to problems with the neck, shoulder joints, or other soft tissues around the shoulder [4]. According to the diagnosis of shoulder pain, it involves adhesive capsulitis, rotator cuff tendinitis, shoulder impingement syndrome, acromioclavicular joint disease, and so on [5]. The term "chronic shoulder pain" refers to shoulder pain that has persisted for more than 6 months [6]. Chronic shoulder pain continues to be prevalent in older populations that are still working, particularly if their work is physically active or, at least, involves the use of their upper limbs [7]. Non-traumatic chronic shoulder pain

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refers to complications such as capsulitis, calcific tendinitis, glenohumeral joint arthritis, polymyalgia rheumatica, rheumatoid arthritis, supraspinatus tendinopathy or subacromial bursitis, rotator cuff tear, referred pain from mid or lower cervical dysfunction, radiculopathy from disc or osteophyte complex [8]. It ruled out shoulder pain due to injuries such as fractures, dislocations, or shoulder separation.

Most research evidence shows that chronic shoulder pain is the third most common type of musculoskeletal pain. This condition can lead to a major impact on health-related quality of life, such as an inability to work and perform domestic and social activities. The worst implications of this condition could bring about serious economic hardships such as job instability, unemployment, or income loss for the affected individuals and their families.

Structurally and functionally, the shoulder is an enormously complex joint as it is one of the most freely moveable areas in the human body. It has a very wide range of movement, which can put the muscles, tendons, and ligaments around the joint under a lot of strain [9]. Four joints are present in the shoulder: the sternoclavicular, acromioclavicular, scapulothoracic, and glenohumeral joints. However, this complexity means that the shoulder tissues are susceptible to damage and degeneration [10].

Shoulder pain develops in or around the shoulder, specifically from its joints and surrounding soft tissues. Noticeably, the pain may be constant, or it may only be present when the shoulder joint is moving. Unattended shoulder pain for a long period will lead to restricted shoulder mobility and chronic shoulder pain. Six of the most common causes of chronic shoulder pain without any injury or any traumatic activity are arthritis, calcific tendonitis, frozen shoulder, rotator cuff tears, spinal issues, rotator cuff tendonitis, and bursitis [11].

Frozen shoulder (adhesive capsulitis) is a self-limiting disease with a chronic character. A decrease in joint volume because of fibrosis and hyperplasia of the joint capsule leads to painful and restricted glenohumeral motion [12]. Rotator cuff disorders may affect one or more portions of the rotator cuff and can be further defined as subacromial impingement (rotator cuff tendonitis). Age is the most common factor for rotator cuff disorders. It is a degenerative process that is progressive [13]. Dull aches deep in the shoulder, disturbed sleep, difficulty combing hair or reaching behind the back and accompanied by arm weakness are the symptoms of rotator cuff disorders. Rotator cuff tears (partial or full thickness) due to overuse, which leads to tendonitis and resulting tearing in the tendons. Rotator cuff tears are also rampantly prevalent, with an age-dependent increase in numbers [14]. Calcific tendonitis is similar to frozen shoulder, but it is due to calcium deposits built up in the muscle or rotator cuff tendon. It is a common disease that usually affects individuals aged between 40 and 60 years, and it seems to be more women affected than men. Clinically, calcific tendinitis is characterized by severe, disabling pain that occurs spontaneously, usually in the morning [15]. Most shoulder pain results from an injury or condition in the shoulder itself, but sometimes shoulder pain stems from a problem in the neck [16]. Shoulder pain is related to spinal issues where the cervical spine and disc issues can be the root cause of it. Regardless of the disorders, shoulder pain is the most common reason for consulting a practitioner [17].

The treatment for chronic shoulder pain mostly depends on the cause and severity of the shoulder pain itself. The general treatment options in conventional medicine are physiotherapy or occupational therapy, arm slings or shoulder immobilizers, or surgery for the most serious cases. Medical practitioners may also prescribe some medications such as oral paracetamol, opioid analgesics, topical nonsteroidal anti-inflammatory drugs (NSAIDs), and oral corticosteroids [18]. However, these options aren’t satisfactory, and most patients seek complementary and

alternative medicine, including acupuncture, as a solution [19].

Acupuncture is one of the therapeutic systems in alternative medicine. It is the oldest Chinese system of therapeutics where needles are pricked in specific acupuncture points of the body along specific meridian lines for the treatment of various diseases [20]. In this modern world, acupuncture is widely used as an alternative or complementary therapy for the treatment of pain [21]. According to Traditional Chinese Medicine (TMC), pain is believed to be the result of a specific blockage or stagnation of the normal flow of vital energy (qi or chi) in the region of injury [22].

In traditional Chinese medicine (TCM), all causes of shoulder pain are termed as "*shoulder at the age of 50 years"* [12]. In the case of chronic shoulder pain, it is believed that such stagnation or blockage of the flow of qi and blood originates in the tendons and muscles of the internal organs, such as the large intestine, small intestine, and internal membrane of acupuncture meridians.

It has been thought that by inserting acupuncture needles at specific points, the normal flow of energy can be restored [23]. Acupuncture treatment is aimed at stopping pain, decreasing inflammation, restoring range of motion, and regaining strength by moving qi and blood, clearing heat and obstruction, and draining dampness from the shoulder region [24]. In modern scientific studies, acupuncture has been shown to have multiple effects on the central and peripheral nervous systems [25]. These effects and other physiologic mechanisms are presumed to change pain perception, although the exact mechanism is unknown [26]. Anyway, research indicates that acupuncture has been shown to influence pain perception by modulating the activity of key subcortical and brainstem sites along the descending pain modulating system pathway [27].

Acupuncture is a non-drug therapy being used more and more to treat shoulder pain. According to research, acupuncture helps relieve pain, reduce inflammation, release tight muscles, and increase range of motion for a variety of shoulder problems.

Medical science hypothesises that acupuncture works either by releasing chemical compounds in the body that relieve pain, by overriding pain signals in the nerves, or by allowing energy (Qi) or blood to flow freely through the body [28].

Numerous research and trials have claimed that acupuncture is one of the most favourable treatments for chronic shoulder pain. However, with very limited high-quality research, the effectiveness of this treatment has still not been proven [29]. In recent years, there has been an increase in the quality of trials examining the clinical effects of acupuncture for back and neck pain, arthritis, carpal tunnel syndrome, fibromyalgia, and upper extremity tendinitis [30]. Research-based evidence shows that acupuncture treatment mostly benefits patients with specific pain conditions such as headaches, chronic idiopathic or tension migraines, neck pain, knee osteoarthritis, and low back pain. Promising but less definitive data exists for chronic shoulder pain, fibromyalgia, temporomandibular joint pain, and postoperative pain [21]. There are a few clinical studies claiming that acupuncture has been reported to be effective for the treatment of various shoulder-related pains. The clinical studies involved, however, were not randomized controlled trials [12]. Recent randomized controlled trials have reported significant and convincing long-lasting effectiveness of acupuncture treatment for chronic neck and shoulder pain [31]. These studies have indicated a greater improvement in shoulder mobility (abduction and arm above head test) for the treatment group in comparison to the control subjects immediately after treatment and after 3 months. The randomized controlled trials indicated that acupuncture is an effective alternative to conventional orthopedic treatment for chronic shoulder pain [32]. Currently, acupuncture is used to treat many medical

problems, particularly chronic pain. Shoulder pain is one of the indications that is most amenable to treatment with acupuncture [33].

Since shoulder pain is believed to be a result of stagnation or obstruction of the flow of qi and blood in the tendons and muscles of the large intestine, small intestine, and internal membrane of acupuncture meridians, several specific acupuncture points and non-acupuncture points along and nearby the meridians of these organs were identified. Non-acupuncture points are points located several millimeters or centimeters from specific acupuncture points, halfway between two parallel meridians or arbitrarily on the side of the trunk or the shoulder region away from most meridians [34]. Those non-acupuncture points are considered equally effective in treating shoulder pain.

The commonly used acupuncture points for chronic shoulder pain are Tiaokou (ST 38), Jianzhen (SI 9), Jianliao (SJ 14), Jianyu (LI 15), Binao (LI 14), Tianzong SI 11), and Tianfu (LU 3). Other suggested points are, Fan Hou Jue (T 22.12), Ce San Li (T 77.22), Lou Zhen (EX-UE8), Houxi (SI 3) and Jian Jing (GB 21) [35].

Six specific acupuncture points, including, Jianyu (LI 15), Binao (LI 14), Hegu (LI 4), Jianzhen (SI 9), Jianliao (SJ 14), and Tiaokou (ST 38) were identified for this study. In addition, another five non-acupuncture points, such as a point at the anterior axillary fold, a point at the posterior axillary fold, a point 2 cm below Tianzong (SI 11), and a point 3 cm below Yanglingquan (GB 34), were identified. In medical terms, non-acupuncture points are similar to trigger points. In many cases, shoulder pain is the result of tight muscles that form pain patterns around this particular points. Inserting acupuncture needles at these particular points will resolve the problem by releasing the tight band that is causing the pain and muscle restriction.

In Chinese Traditional Medicine (TCM) practices, Tiaokou (ST38) is used as one of the crucial single distal acupuncture points for treating shoulder adhesive capsulitis [36]. From ancient times to the present day, this point has been used for all kinds of shoulder pain, acute or chronic.

In this case study, four patients suffering from non-traumatic chronic shoulder pain were selected. The aim of this study is to evaluate the effect of acupuncture as a treatment procedure, using a protocol based on the needling of six specific acupuncture points combined with five non-acupuncture points to enhance the speed and degree of recovery of non-traumatic chronic shoulder pain.

Materials and Methods

Selection of Patients

Participants for this study were selected among the patient's seeking treatment in our acupuncture treatment center. Due to the COVID-19 pandemic, movement control orders, time constraints, and participants' anxiety, as well as the fear of participant dropout, only four patients were selected for this study. Patients' selection was based on the following criteria:

Inclusive criteria: Only patients with shoulder pain due to non-traumatic injuries, experiencing strong pain for more than 8 weeks, mobility impairment, and impairment in daily activities such as extension, flexion, abduction, or external rotation, and with valid medical reports are eligible.

Exclusive criteria: Participants must not be pregnant or lactating, have no recent shoulder surgery, fracture, severe infection, neurological or psychiatric disorders, or deformities, and are not undergoing any form of shoulder pain treatments. Written informed consent from all the participants was required to proceed with the treatment, and they were given enough time to consider their participation in this study.

Description of the Case

Four patients were selected according to the selection criteria set for this case study.

Subject A: A female, 36 years old, working as a banker, with chronic pain in her right shoulder, without any prior injury. She felt weak and in

pain when moving her right hand. Unable to lift the right hand more than 48 degrees, followed by pain and loss of motion in the shoulder. There was a silent grinding, clicking, or cracking at the joint. She felt stiffness at the joint and was unable to perform office work and normal activities like combing her hair, washing her face, and hooking up her bra. She had sought medical treatment. Her doctor diagnosed it as arthritis and had given her anti-inflammatory drugs and painkillers. Not much improvement after 8 weeks of medication and often on medical leave. She had discontinued hospital medications for almost 3 months. Other complaints are being unable to sleep on the right side, being depressed, having anxiety, and having low motivation to do office jobs.

Subject B: A male, 56 years old, working as a carpenter, with chronic pain in his right shoulder, without any prior injury. He felt constant pain and stiffness at the shoulder joint. He was unable to raise his right hand more than 65 degrees. Movement of the shoulder is limited, and is unable to perform normal activities like hammering, lifting objects, and handling tools. He had sought medical treatment. Doctors diagnosed it as adhesive capsulitis (frozen shoulder), and he was given anti-inflammatory drugs, pain killers, steroid injections, and had undergone physiotherapy. Not much improvement after 12 weeks. He had stopped all the hospital medication and physiotherapy. Other complaints are nocturnal shoulder pain on the right side, disturbed night sleep, anxiety, depression, and low motivation to do his job. He had stopped working for more than 8 weeks.

Subject C: A female, 35 years old, working as a cook in a busy restaurant, with chronic pain in her left shoulder (left-hander), without any prior injury. She complained of pain and stiffness in the shoulder area. She experienced painful shoulder movement, especially in the morning, with limited range of movement and being unable to lift her hand more than 60 degrees. She was unable to perform normal activities such as cooking, cutting vegetables, washing, combing her hair, and washing her face and her pain worsened at night. She had sought medical treatment. Her doctor diagnosed it as calcific tendonitis and prescribed her anti-inflammatory drugs, painkillers, and injections. Not much improvement after 15 weeks. She had stopped all medication. Other complaints include an inability to sleep on her left side, the pain coming on suddenly or building up gradually, feeling constant pain, and low motivation to do her job. She was using her right hand as her working hand.

Subject D: A female, 40 years old, a teacher with chronic pain in her right shoulder. She felt a sharp pain when her arms were extended, lifting and lowering the arm from a raised position or when reaching out. She felt pain when lying on her affected side. She complained of pain or achiness at night, which affected her ability to sleep. She felt weakness and stiffness in her right shoulder and arm. She felt a limited range of arm movement and was unable to lift her hand more than 40 degrees. She was unable to use her right hand properly due to persistent pain that affected her everyday activities. She had sought medical treatment. Her doctor diagnosed her condition as shoulder impingement and had given her oral anti-inflammatory medications and nerve pain relief drugs. There was not much improvement after 10 weeks of medical treatment, and she had stopped hospital medication.

Materials

Material used for this study are single-use sterile acupuncture needles (0.30 mm diameter x 40 mm length), Zhongyan Taihe; Beijing Zhongyan Taihe Medical Instrument Co., Ltd, China. Wong-Baker FACES Pain Rating Scale and Medical Goniometer Angle Ruler Joint Bend Measurement Tool (Brand OEM, Model G01).

Methodology

Due to the COVID-19 pandemic, movement control orders, time constraints, and

participants' anxiety as well as the fear of participants' dropout, the treatment was designed for just six treatment sessions only. Each treatment took about 40 minutes. The frequency of the treatment sessions was three times per week. The whole treatment took about two weeks to complete. The participants could stop the treatment at any session, but with the condition that they must receive a minimum of five acupuncture treatments.

The Wong-Baker FACES Pain Rating Scale was used to evaluate the degree of pain before treatment and twenty minutes after each treatment. This scale was selected because it is easy to use and is frequently used in adults with chronic pain [37]. The Wong-Baker Faces Pain Rating Scale is a pain scale that was developed by Donna Wong and Connie Baker to rate current pain intensity. It is a visual analogue scale to assess pain, normally in pediatric patients, but it is used in older patients too. The scale uses facial expressions to indicate pain level. The facial expressions range from a happy, smiling face at 0, to a crying face at 10, which represents the "most unbearable pain". It is scored by choosing a number between 0 to 1 (no pain), 1.1 to 3 (mild pain), 3.1 to 5 (moderate pain), 5.1 to 7 (severe pain), 7.1 to 9 (very severe pain), and 9.1 to 10 (worst pain level). The Wong-Baker Faces Pain Scale is a reliable and valid alternative for assessing pain intensity in cognitively intact and mildly to moderately impaired elderly people. [38].

A Medical Goniometer Angle Ruler Joint Bend Measurement Tool (Brand OEM, Model G01) was used to evaluate the mobility range of the affected shoulder. A normal range of motion for shoulder flexion is 180 degrees [39]. The Goniometer has been proven as a reliable and valid tool for measuring shoulder mobility range [40]. The mobility range test was performed at the beginning of the treatment and twenty minutes after each treatment.

The acupuncture treatment was conducted according to a treatment protocol already developed for this study, which was adopted from a designed protocol by a group of researchers led by Dr Qing-Nan Fu from the Acupuncture and Moxibustion Department Beijing Hospital of Traditional Chinese Medicine [17]. Specific acupuncture points (acupoints) and specific non-acupuncture points (acupoints) for chronic shoulder pain were used in this study. Specific acupoints are divided into local acupoints and distal acupoints according to their meridian location, whereas specific non-acupoints are divided into local non-acupoints and distal non-acupoints according to their anatomical position. In total, eleven acupoints were selected, as shown in Table 1.

Table 1. Selected Specific Acupoints and Specific non-acupoints for non-traumatic Chronic Shoulder Pain Treatment

Specific acupoints		**Specific non-acupoints**	
Local acupoint	**Distal acupoint**	**Local non-acupoint**	**Distal non-acupoint**
Jianyu (LI 15)	Hegu (LI 4)	Anterior axillary fold	3 cm below Yanglingquan (GB 34)
Binao (LI 14)	Tiaokou (ST 38)	Posterior axillary fold	
Jianzhen (SI 9)		2 cm below Tianzong (SI 11)	
Jianliao (SJ 14)		1 cm inward Tianfu (LU 3)	

Table 2. Location of the Selected Acupoints and non-acupoints for non-traumatic Chronic Shoulder Pain Treatment

On the same side of the affected shoulder		**On the opposite side of the affected shoulder**	
Local acupoint	**Local non-acupoint**	**Distal acupoint**	**Distal non-acupoint**
Jianyu (LI 15)	Anterior axillary fold	Hegu (LI 4)	3 cm below Yanglingquan (GB 34)
Binao (LI 14)	Posterior axillary fold	Tiaokou (ST 38)	-
Jianzhen (SI 9)	2 cm below Tianzong (SI 11)	-	-
Jianliao (SJ 14)	1 cm inward Tianfu (LU 3)	-	-

According to clinical practice, local acupoints could contribute to pain relief, while distal acupoints could improve the range of motion in the joints [17].

Needles were inserted into specific local acupoints and specific local non-acupoints on the same side of the affected shoulder, while needles for specific distal acupoints and specific distal non-acupoints were inserted on the opposite side of the non-affected shoulder. Sterile, single-use needles were used. First, needles will be inserted at specific distal acupoints (LI 4 and ST 38) and specific distal non-acupoints (3 cm below GB 34) for the first 20 minutes, followed by inserting needles at the specific local acupoints (LI 14, LI 15, SI 9 and SJ 14) and specific local non-acupoints (anterior axillary fold, posterior axillary fold, 2 cm below SI 11 and 1 cm inward LU 3) for another 20 minutes. The needles at acupoint Tiaokou (ST 38) will be rotated up and down to induce a needle sensation (‘de qi’) for about 30 seconds. [41].

It was found that acupuncture at ST 38 point on the opposite side of the affected shoulder could better alleviate pain and improve shoulder function in chronic shoulder pain patients than acupuncture at ST 38 point on the same side of the affected shoulder [38].The depth of the needle for specific acupoints was about 10 to 15 mm, while it was 5 mm for specific non-acupoints. Sterile acupuncture needles sized 0.30 mm x 40 mm were used on all the twelve points. The patients were kept in a sitting position on a half-inclined chair throughout this treatment. The same acupoints were used for all the patients throughout these six treatment sessions.

Results

As shown in Table 3, all four cases reported clear improvement in their pain condition after six acupuncture treatments using specific acupoints and non-acupoints for non-traumatic chronic shoulder pain for a period of two weeks.

Table 3. Assessment of Pain Score before and after Acupuncture Treatments

Treatment								
	Case A		**Case B**		**Case C**		**Case D**	
	Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
1st	9	7	9	8	9	8	8	6
2nd	7	6	8	7	8	6	7	5
3rd	6	4	7	6	6	5	5	4
4th	4	2	6	4	5	3	4	2
5th	2	1	5	3	3	1	1	0
6th	2	1	3	2	2	1	0	-

Improvement can be seen in the reduction of the pain score. In just one week of acupuncture treatment (first three treatments), the overall pain reduction for case A was 56% (pain score dropped from 9 to 4), case B was 33% (pain score dropped from 9 to 6), case C was 44% (pain score dropped from 9 to 5) and case D was 50% (pain score dropped from 8 to 4).

The overall pain score at the end of this study for case A dropped from 9 to 1 (worst pain to mild pain), case B dropped from 9 to 2 (worst pain to mild), case C dropped from 9 to 1 (worst pain to mild pain), and case D dropped from 8.0 to 0.0 (very severe pain to no pain) just in 6 treatments only. Case D shows a remarkable recovery. Cases A, B, and C did not recover fully from shoulder pain within 6 treatments. Initially, cases A, B and C demonstrated the highest pain scores (worst pain), whereas case D demonstrated the highest pain score (very severe pain). Surprisingly, case D was able to reach a zero-pain level (no pain) at the end of the 5th treatment and requested to discontinue the 6th acupuncture treatment. For the purpose of this study, case D continues the pain assessment and straight arm flexion assessment until the 6th session. Cases A, B, and C completed their six treatments successfully.

Noticeably, after the 6th acupuncture treatment, case B still has not fully recovered from her shoulder pain. There was still some dull pain and stiffness in her shoulder. Case A and case C showed a promising recovery after the 6th treatment.

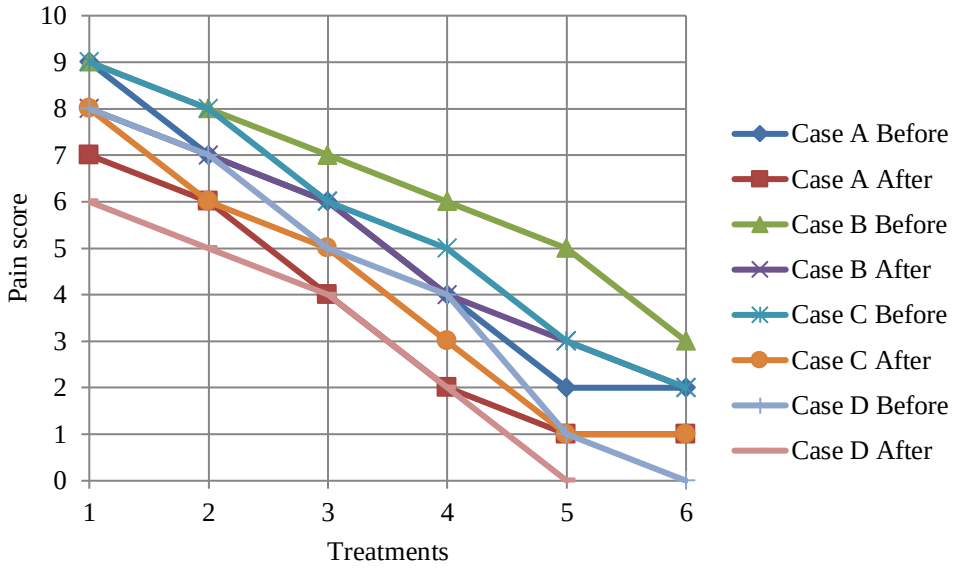

Figure 1. Assessment of Pain Score Improvement, before and after Acupuncture Treatments

Figure 1 clearly shows the progressive recovery of all the patients in this case study. These positive results signify that there is a positive effect of this acupuncture treatment for non-traumatic chronic shoulder pain.

The assessment of straight arm flexion amplitude before and after the acupuncture treatments along the study period are shown in Table 4.

Table 4. Assessment of Straight Arm Flexion Amplitude before and after the Acupuncture Treatments, along the Study Period

	Case A		**Case B**		**Case C**		**Case D**	
Treatment								
	Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
1st	48°	90°	65°	80°	60°	95°	40°	85°

2nd	75°	118°	75°	107°	88°	104°	104°	108°
3rd	96°	125°	98°	118°	102°	129°	129°	139°
4th	114°	143°	111°	120°	118°	135°	135°	167°
5th	138°	150°	116°	144°	130°	155°	155°	177^0
6th	148^0	158°	141°	150°	151°	160°	175°	-

As shown in Table 4, cases A, B, C, and D show a clear improvement in their mobility and range of shoulder movement following the six acupuncture treatments using specific acupuncture points and non-acupuncture points for non-traumatic chronic shoulder pain. Surprisingly, just in one week of acupuncture treatments (first three treatments), the overall improvement in mobility and range of shoulder movement for case A was 61% (48^0 to 125^0), case B was 45% (65^0 to 118^0), case C was 53% (60^0 to 129^0), and case D was 71% (40^0 to 139^0).

All cases presented a noticeable improvement in mobility and range of shoulder movement after completing the sixth treatment within the duration of six weeks. Case A had straight arm flexion from 48 degrees with severe pain to 158 degrees without pain. Case B had straight arm flexion from 65 degrees with severe pain to 150 degrees with mild pain, Case C had straight arm flexion from 60 degrees with severe pain to 160 degrees with mild pain, and Case D had straight arm flexion from 40 degrees with severe pain to 175 degrees without pain.

Case D showed the most remarkable straight arm flexion, with the score almost reaching 140 degrees after the third treatment. At the end of the fifth treatment, case D was able to flex her arm almost 180 degrees. With this score, the patient was allowed to discontinue the sixth acupuncture treatment. The overall improvement in mobility and range of shoulder movement for case A was 69%, for case B, it was 57%, for case C, it was 63%, and for case D, it was 77%. The overall shoulder mobility and range of shoulder movement improvement for all the cases throughout the six treatments was 67%.

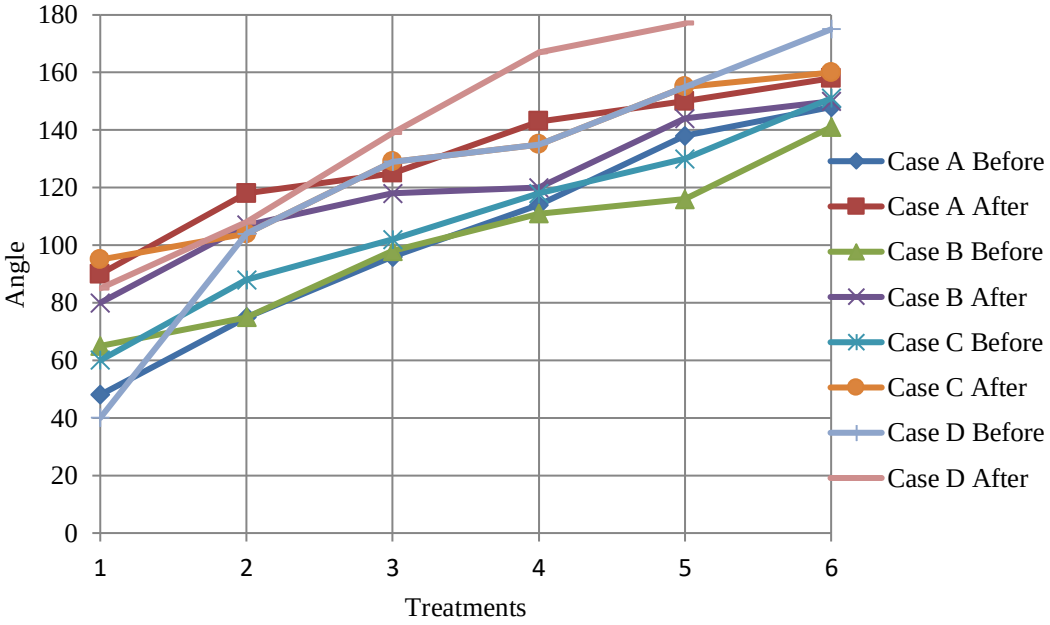

Figure 2. Assessment of Assessment of Straight Arm Flexion Amplitude, before and after Acupuncture Treatments

Figure 2 shows a progressive, positive recovery of the shoulder mobility. This positive result supports the positive effect of acupuncture for chronic shoulder pain since there is a great correlation between pain and mobility in non-traumatic chronic shoulder pain.

The overall improvement for pain and shoulder mobility after the sixth acupuncture treatment are shown in Figure 3.

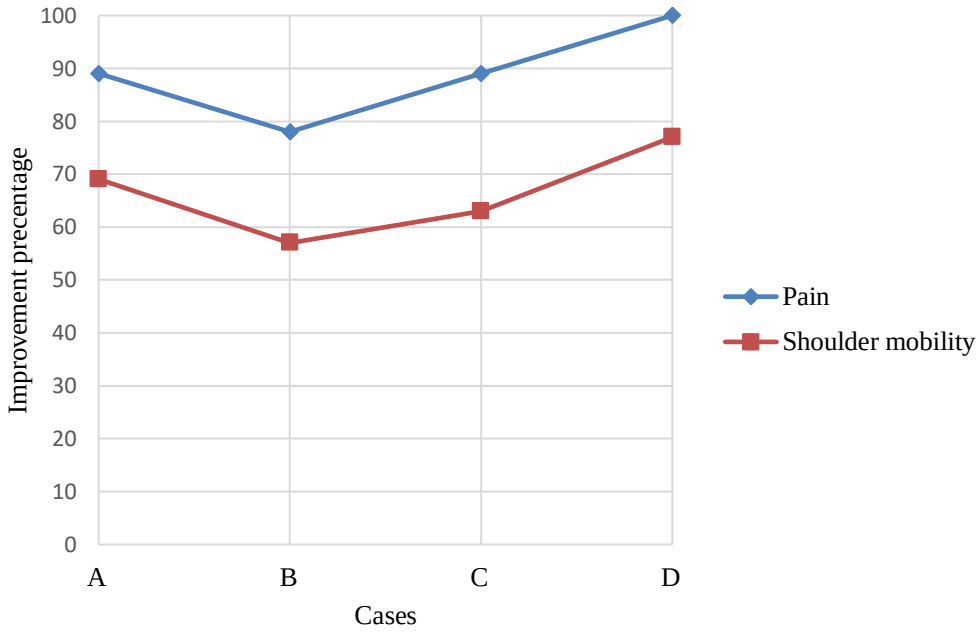

Figure 3. Overall Improvement Percentage for Pain and Arm Mobility of each case at the End of Six Treatments

The overall improvement in shoulder pain for case A was 89%, for case B it was 78%, for case C, it was 89%, and for case D, it was 100%. Regarding pain, case D experienced a remarkable pain improvement, whereas case B experienced a satisfying pain improvement after going through six acupuncture treatments for chronic shoulder pain. The overall shoulder pain improvement for all the cases throughout the six treatments was 89%. The overall improvement in mobility and range of shoulder movement for case A was 69%, for case B it was 57%, for case C, it was 63%, and for case D, it was 77%. Again, case A experienced a remarkable improvement in mobility and range of shoulder movement, whereas case D showed satisfying mobility and range of shoulder movement improvement at the end of the sixth acupuncture treatment in two weeks' time. The overall shoulder mobility and range of shoulder movement improvement for all the cases in this study was 67%.

Discussion

The results of this study showed a clear positive improvement in the shoulder pain of the patients. There was a remarkable reduction in the pain condition and a noticeable improvement in the range of shoulder movement among the cases in this study.

Out of four cases, patient Case D (shoulder pain related to a spinal issue) showed remarkable improvement in pain reduction and range of movement. This is the same for patient case A (arthritis). Patient case D recovered fully within five treatments (0 pain level and 178 degrees of straight arm flexion) out of six actual treatments, while patient case A recovered (0 pain level and 175 degrees of straight arm flexion) within six treatments. This result indicates that patients with chronic shoulder pain due to spinal issues and arthritis respond much faster to acupuncture treatment than other types of chronic shoulder pain. Even though there was a clear positive

effect of acupuncture in all the cases, the results showed that case B (frozen shoulder) and case C (calcific tendonitis) did not fully recover within the six treatments. After the sixth treatment, patient case C, with calcific tendonitis (1 pain level and 158 degrees of straight arm flexion), still experienced mild pain (with some restricted movement in the shoulder), whereas patient case B, with a frozen shoulder (2.0 pain level and 145 degrees of straight arm flexion), demonstrated much higher pain level and less straight arm flexion than case C.

This result indicates that the combination of specific acupuncture points and specific non-acupuncture points is effective for various types of non-traumatic chronic shoulder pain. Besides that, this study shows that different types of non-traumatic chronic shoulder pain need different time frames for recovery. This result also indicates that future studies should categorize types of shoulder pain accordingly, and studies must be done separately.

This study shows that acupuncture can be used as an effective therapeutic tool for chronic shoulder pain. The acupuncture treatment used in this study was conducted according to the principles of traditional Chinese medicine. Classical acupuncture prescriptions for chronic shoulder pain are designed by selecting specific acupuncture points and non-acupuncture points within the local and distal acupuncture points. According to clinical practice, specific acupuncture points and non-acupuncture points at distal points could improve the range of motion, while specific acupuncture points and non-acupuncture points at local points could be effective in providing pain relief [18].

A study on the comparative effects of acupressure at local and distal acupuncture points on pain conditions and autonomic function, showed that acupressure on local and distal acupuncture points, significantly improved pain conditions. The study concludes that acupressure on only the local acupuncture points affected the autonomic nervous system, while acupressure on distal acupuncture points has different physical effects according to location [42].

The combination of specific classical Chinese acupuncture points and specific non-acupuncture points could regulate the “qi” (vital energy) and blood by dispersing pathogenic factors such as excess wind, cold, and dampness, removing obstruction and relaxing the tight muscles in the affected meridian and its collaterals [12]. The effect of acupuncture treatment on pain relief has been often reported by many authors. The immediate analgesic effect on various types of pain may be involved in the nociceptive pathway, including descending noradrenergic and serotonergic pathways [43, 44]. Previous studies have shown similar results to the present study [45]. Acupuncture has been shown to be a safe treatment with a significant effect in regard to reducing pain, improving shoulder function, and flexion ROM in the short term and midterm [46]. Some studies suggest that acupuncture may be an effective treatment for chronic shoulder pain, but results show there was no difference between the individualized acupuncture and standardized acupuncture treatments [47]. Even though reviews of other studies concluded that there are no firm conclusions that can be drawn regarding the efficacy of acupuncture for shoulder disorders [28], there are sufficient studies to support the efficacy of acupuncture for shoulder pain [47, 48].

Conclusions

This case study illustrates the effect of acupuncture treatment using the combination of selected specific acupuncture and non-acupuncture points in non-traumatic chronic shoulder pain. The result shows a positive improvement in pain relief, mobility, and range of motion of the affected shoulder. At the same time, the treatment is also able to reduce the other side effects of chronic shoulder pain, such as sleep deprivation, depression, anxiety, and low motivation. The findings of this study are supported by findings from other research

regarding acupuncture treatment for shoulder pain. The result clearly indicated that acupuncture treatment using specific acupuncture points with a combination of specific non-acupuncture points had produced a positive effect in the treatment of non-traumatic chronic shoulder pain, with noticeable pain relief and improvement in shoulder joint mobility and range in just two weeks' time. Although the recovery rates for all four patients were not at the same level, each patient had shown good improvement in their pain reduction and shoulder mobility, according to their respective cases. It is important to mention that these results were achieved within a short duration of two weeks, with just three treatments per week. Compared to other studies, this case study involves a very modest intervention but with a positively high level of recovery. This case study will not only increase knowledge about the effects of acupuncture treatment for non-traumatic chronic shoulder pain but also confirm the effect of the combination of specific acupuncture points and specific non-acupuncture points used in this study. This study too might be able to provide additional data on the potential role of acupuncture in the treatment of non-traumatic chronic shoulder pain, particularly for those patients who do not respond well to conventional therapy or for those who don't want to seek conventional therapy. I am aware of the limitations of this study and suggest more research is needed to investigate the effect of acupuncture treatment on non-traumatic chronic shoulder pain. The results of the study indicate that future studies should categorize types of shoulder pain accordingly, and each study must be done separately according to the type of shoulder pain.

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Conflicts of Interest

The authors have no conflicts of interest to declare.

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The Relationship between Adverse Life Experiences in Childhood and Unhealthy Eating Behaviour in Adulthood: A Literature Review

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Abstract

The manuscript is simply discussing several forms of adverse childhood experiences (ACE) and their negative impact on children. ACE may contribute to the development of eating disorders (ED) that mostly appear during adolescence, and if untreated earlier, children will suffer ED chronically. Undoubtedly, we are humans that make mistakes, and such mistakes may be stressful to others. Also, life is not so easy; it involves difficulties as well as enjoyment. Thus, in this study, the author analyzed the stressful conditions that occur in childhood and their negative impact on human behaviour that can be developed into many disorders such as eating disorders, obsessive-compulsive disorders, and others. The author used the methodology of searching articles published between 1990 and till present. The authors investigated the factors that play a role in the appearance of such disorders such as culture, media, genetics, upbringing, environment, peers, school, and others. The severity of disorders depends on the intensity, harshness, and frequency of ACE. Moreover, the relative relationship between the child and the one who harmed him plays a significant role in the severity of disorders. Studies proved that treatment of disorders is not impossible, and relief can occur.

Keywords*: Adverse childhood experiences, Abnormal eating behaviours, Childhood psychological problems, Eating disorders, and treatment of eating disorders.*

Introduction

Undoubtedly, most people were exposed to different life experiences during their childhood that has a great impact on their psychological, mental, and physical health. States of mind that are formed during childhood through the interaction with attachment figures are undoubtedly affecting adults' behaviours. As a result, the adverse childhood experiences that last without tackling them and resolving the resulted impairments from such painful experiences may contribute to despair or perturbation, which leads to compensatory behaviours such as smoking, addiction, or unhealthy eating behaviours. Moreover, the consequences of such compensatory behaviours are more dangerous, for example, binge eating disorder is not confined to a disorder but can contribute to type two diabetes mellitus, which leads to heart disease. Time is not a curing process, but conversely, it buries the deep pain until it is lost and then appears in the form of compensatory behaviours. Encountering painful experiences and dealing with them are the first steps in the healing journey.

Aim and Objectives of the Study

The aim of the study is to assess the current understanding of the influences of adverse life experiences of children on their eating behaviours in adult life.

The manuscript includes three objectives; first, finding out the adverse life experiences in childhood that lead to abnormal eating behaviours in adults. Second, to find out the psychological concepts and principles that explain such behavioural influences. Third, to understand the extent to which these childhood

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experiences lead to changes in behaviour in adulthood.

Research Question and Its Significance

Mental health is one of the integral cores that affects society's progression, thus, discussion of the contributions, nature, and methods of treatment of psychiatric disorders is significant to society's development. The research question in this study is, how do adverse life experiences in childhood affect ED in adulthood? The authors answered this question through the study and reached a conclusion that could improve the well-being of people suffering from ED.

Methodology

Search Strategy

The author of this manuscript searched ScienceDirect.com, Google Scholar, and academia.edu through the use of different combinations of the following keywords: adverse childhood experiences, childhood psychological problems, and causes of abnormal eating behaviours in adults, as well as eating disorders and treatment of eating disorders. The search for literature was limited to publications in English especially the articles published between 1990 to present. Also, related articles were searched for, and the references of qualified articles were examined for further sources of information.

Discussion based on the Literature Review

Categories of Child Abuse

A study [5] was performed a study that illustrates the adverse childhood experiences (ACE) and their relation to unhealthy behaviours during adulthood. According to the study, maleficent childhood experiences are categorized as physical, psychological, or sexual abuse and household dysfunction such as parental addiction, household violence, mental illness of one parent, or incarceration of one of the parents. Other adverse childhood experiences such as trauma, neglect, bereavement, child labour, and exploitation. Such maleficent experiences have a negative impact on a child's emotions that, lead to deep frustration and depression. When such experiences are high frequency rated, high in intensity, or the exposure lasts for a long period of time, the child tries to escape emotionally from such painful emotions and tries to find an outlet in order to survive and tolerate such painful experiences.

The correlated interaction with deep pain in the form of unhealthy behaviours may be chronic, problematical, and hard to terminate, such as eating disorders, smoking, promiscuity that contributes to sexually transmitted diseases such as HIV/AIDS, substance abuse, depression, committing suicide, or lack of physical activity. Unhealthy behaviour contributes to treacherous diseases that may lead to death; for example, binge eating leads to obesity which contributes to type two diabetes mellitus (T2DM), which has many complications. These complications are divided into macrovascular and microvascular complications such as foot weakness and ulcers, amputation, cardiovascular diseases (CVD), strokes, kidney damage, eye problems such as Glaucoma that may contribute to loss of vision, neuropathy that may contribute to nerve deterioration, chronic high blood pressure, ketoacidosis that contributes to coma and may lead to death, skin complications, dental diseases and problems during pregnancy and delivery. Studies found that obesity is the main causative factor of T2DM because of insulin resistance and the very low level of plasma glucagon [16]. Studies claimed that the impact of severe experiences during childhood differs according to the rate of exposure to one or more adverse experiences. Thus, research revealed that sexual abuse is very painful to the child, particularly when it lasts for a long period of time, when it is very violent such as rape, or when the culprit is one of the parents. It is very difficult for the child to think that his criminal

parent doesn't love him but instead, he tries to empty his frustration, fear, and pain into unhealthy behaviour that lasts all over his life. Moreover, he learns that life is based on exploitation and as a result, he may cause harm to others (See Figure 4 & 7).

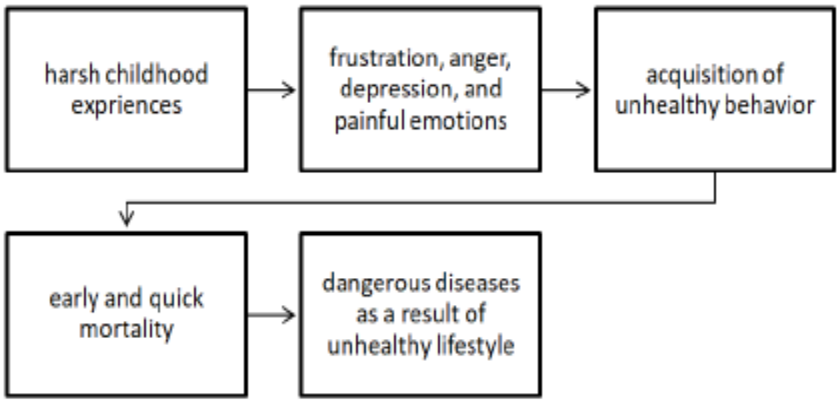

Figure 1. Consequences of Adverse Childhood Experiences

Studies have found out that parental overprotection and forcing the child to be involved in an activity or something that he doesn't like are factors that may contribute to eating disorders among children. Moreover, discussion of sexual issues at an earlier timing in which adolescents are not ready and well trained to deal with such issues may constitute stress on them, which may contribute to eating disorders. Changing the place of residency can be stressful for children and may contribute to acquiring coping behaviours. Also, eating disorders were found among children with disabilities, children whose siblings experience disability, and children who grew in institutions or orphanages [11].

Table 1. Types of Adverse Childhood Experiences

Physical abuse	**Sexual abuse**	**Emotional abuse**	**Household dysfunction**	**Traumatic events**	**Neglect**
Kicking	Sexual assault	Bullying	Domestic violence	Bereavement	Physical neglect
Pushing	Rape	Verbal abuse	Incarceration of one of parents	Accidents	Emotional neglect
Beating	Provocation	Threatening	Addiction	Natural disasters	Educational neglect
Punching	Molestation	Exploitation	Mental illness	-	Medical neglect
Grapping	-	Ignoring	Divorce	-	Moral neglect
Slapping	-	Rejection	-	-	-
Slamming	-	-	-	-	-
Burning	-	-	-	-	-
Using sharp tools	-	-	-	-	-
Threatening with sharp tools	-	-	-	-	-

Factors Contributing to Eating Disorders' Development

Eating disorders are simply a sort of mental illness caused by different factors such as genes because studies found that responsible genes develop obsessive-compulsive disorder (OCD) during infancy, eating orders, depression, and perturbation during adulthood [23]. Another factor was found to affect evolving eating disorders: personal characteristics such as perfectionism or impulsiveness. Also, other mental illnesses can be causative factors to eating disorders such as schizophrenia, OCD, or neuroticism.

Cultural notions and media can contribute to eating disorders, as studies found that the rate of people who experience eating disorders among cultures that do not accept thinness is lower than the rate of people who suffer from eating disorders in other cultures. A study [24] illustrated that there is a relationship between dysfunction of the endocrine gland and anorexia nervosa. Also, children may experience unhealthy eating behaviours if their mother suffers from an eating disorder.

Eating disorders are more common in women than men, as experiments showed that women endure starvation more than men because of their different metabolic nature and sex characteristics [23]. Studies found that eating disorders may cause death if untreated and are considered chronic as people who experience eating disorders show a high percentage of relapses [23]. They almost appear during adolescence and also may appear among children as studies found that high rates of children whose ages range from nine years old to 13 years old don't take their breakfast every day, and such behaviour has a negative impact on their health [6]. Another study had claimed that eating disorders appear more among male children than female children, but after maturation, boys develop other coping behaviours rather than ED, while during adolescence and adulthood, ED is more common among girls than boys [20].

Types of Eating Disorders

A study [6] revealed that eating disorders include various types such as Anorexia nervosa and Bulimia nervosa that are considered clinical disorders, i.e., most patients who go to clinics or hospitals experience anorexia or bulimia. Other unhealthy eating behaviours have not been specified above, such as binge eating, night eating syndrome, and others (See Table 2).

Both anorexia and bulimia are not only confined to physical problems such as hormonal disturbances, kidney failure, anemia, bone and teeth weakness, dehydration, or heart diseases but also patients suffer low self-esteem, persistent fear of weight gain, anxiety, depression, substance abuse, social problems, attempts of suicide or even committing suicide. Studies found that the rate of depression, suicide, and substance abuse among patients with anorexia, bulimia, or binge eating disorder is higher than the rate among other people [6]. In the case of anorexia, girls are often underweight, but they see themselves obese, so they stop dieting because of weight gain obsession. In case of bulimia, girls' weight maybe normal, but they experience frequent binge eating of large amounts of food in short periods of time accompanied by lack of control, and followed by unhealthy purging behaviours such as intentional vomiting, using laxatives, diet loss pills or over-exercising [6]. Studies found that a lack of zinc is prevalent among children who experience anorexia nervosa [24].

Purging behaviour can contribute to hypokalemia because of excessive loss of water and minerals through the overuse of laxatives and also because of the excessive loss of acids through vomiting. As a result, they may suffer renal damage, nephropathy, and other cardiovascular diseases that may lead to death [13]. Binge eating is considered as frequent overeating of a large amount of food in short

periods of time regardless of satiety, accompanied by lack of control, secrecy, guilt, and depression, but it is not accompanied by purging behaviours. It may contribute to severe obesity and, subsequently type two diabetes mellitus. It is common among people that suffer from binge eating disorder BED that they have a phobia of gaining weight and over concern about their body weight and shape. This is the trigger that pushes them to start binging episodes, after which they become more depressed and feel shame, guilt, and despair [19].

Past researchers revealed that higher mortality rates are shown among patients who suffer anorexia nervosa, but a current study showed that higher suicide mortality rates were observed among patients who suffer bulimia nervosa and non-specified eating disorders. Women aged between 30 to 40 years old showed the highest rates of suicide. Moreover, the study claimed that suicide mortality rates among people who suffer from eating disorders are higher than mortality rates that are resulted from other problems such as substance abuse, health problems, or traumatic problems [3].

Studies claim that it is common among adolescents who suffer from eating disorders (ED) that they don't understand nor accept their negative emotions. Thus, they cannot express their feelings nor deal with them, so they perform an alternative behaviour in order to relieve pain and regulate their painful emotions but in a deleterious way. Emotional disturbance is normal during adolescence because simply it is the phase of emotional development, but if the parents and adolescents cannot deal with it in the right way, it will be problematic and may contribute to a lack of emotional regulation [25]. Emotional eating is characterized by eating anything at any time and difficulty in choosing the type of food that is desired to be eaten by the adult who suffers from BED. Studies found that levels of cortisol among women who suffer from BED are higher than that of other women when they are put under stressful conditions. It is known that the cortisol hormone is highly secreted during stressful conditions, and it is responsible for appetite control [22]. That's why patients who are emotionally driven to binge eating episodes have a great problem with feelings of satiety and hunger. Studies revealed that women who are confident of their physical needs, such as the feeling of hunger, satiety, thirst, exhaustion, sadness, depression, or other feelings, are less susceptible to developing ED [22].

Furthermore, children experience other types of disorders as pervasive refusal syndrome, in which they refuse to eat, drink, do activities, or have social participation. Continuous exposure to violence, sexual abuse, or harsh trauma may contribute to this pervasive refusal syndrome.

Selective eating is another type of eating disorder in which children select one category of food and refuse other types of food, such as eating carbohydrates only. This type does not continue to adulthood. Food avoidance eating disorder (FAED) is similar to anorexia nervosa but with less severe symptoms [24].

Diagnosis

Eating disorders (ED) can be diagnosed through body max index (BMI), presence of negative thoughts, low self-esteem, low self-confidence, depression, anxiety, presence of harsh childhood experiences, presence of unordinary behaviours such as purging, and social isolation. Studies found that it is undesirable to diagnose anorexia nervosa among children on the basis of low body mass index (BMI) because children aged between eight to 13 years old almost have low BMI. Thus, it is practical to diagnose anorexia nervosa among children through the other symptoms. Moreover, ED can be diagnosed through lab investigations as patients who suffer from BED have high levels of blood insulin and leptin because their body became reluctant to normal levels of insulin and leptin secretions. It is known as insulin resistance and leptin resistance [12]. That's why most diabetic

type two patients are insulin resistant. Also, AN can be diagnosed through a complete blood count (CBC) that shows a number of red blood cells and haemoglobin in the blood. Severe BN can be diagnosed through levels of potassium and kidney functions. ED can be diagnosed in children through their eating avoidance, eating during a prolonged period of time, keeping food and eating it in a secret place, and phobia of weight gain because studies found that it is so difficult for the child to express his fear of becoming fat, that's why it is more precise for the therapist to diagnose ED through such behaviours not according to what expressed by the child [20]. Moreover, recent studies have revealed that ED has a negative impact on the development of secondary sex characteristics, menstrual cycle, and bone development [20].

Relationship between ACE and ED

A study [5] found that there is a significant relationship between harsh childhood experiences and evolving of eating disorders. A case study was performed about a patient who was suffering from chronic anorexia nervosa that lasted 19 years before starting treatment and the patient experienced separation of her parents when she was a child, and then she realized that she was not capable of forming healthy close relationships when she grew up. After she suffered the bereavement of her grandmother, she was so depressed, and her journey with an ED began to appear as a coping behaviour as well as smoking and alcohol abuse (see Figure 6). Moreover, she had more than one attempt to commit suicide. The patient showed anorexia nervosa symptoms such as the denial of her body underweight, refusal to eat to reach a normal weight, an obsession with food, over-exercising, and continuous fear of gaining weight. After her long-suffering with ED, she was diagnosed with hypokalemic nephropathy, which may lead to severe renal damage [13].

The research found that there is a significant relationship between the effect of puberty on mood fluctuation and personality formation among girls experiencing eating disorders [17]. When adolescents struggle with domestic violence, traumatic incidents, or any type of abuse besides their struggle with their difficult development stage, it may contribute to suffering from eating disorders or any other unhealthy coping behaviour.

Research asserted that the lack of unconditional love and acceptance given by parents to their children is one of the significant factors that lead to eating disorders [14]. Stress is one of the most important causative factors of eating disorders as when the child is put under highly stressful conditions, and he may discharge stress in the form of eating too much food that exceeds his stomach capacity if such behaviour continues for a long period of time, the child will be obese (see Figure 2). Many societies adopt discrimination and bullying behaviours against obese people, including obese children. Moreover, the media promotes thinness and measures the beauty of people, especially girls, according to their body shape. Such notions increase stress over obese children, that contribute to deep low self-esteem to the extent that the child may suffer self-hatred, depression, and anxiety. Such deep painful feelings contribute to more and more overeating, then more and more weight gain, then more binging, and so on. It is a closed circuit that is so hard for a child or even an adult to get away from it, particularly if there is a lack of support or exhibiting dislike behaviours by parents against their children's body shape. The self-image of the child is considered more important than his actual body weight because internal beliefs help in diagnosing the real problem in order to attain effective treatment [21]. Furthermore, the child's mental state, his behaviours such as impulsiveness, seeking self-perfection, aggression, depression, anxiety, low self-esteem, low self-confidence, and binge eating are regarded as an alarm to the development of eating disorders and other disorders psychological disorders [21].

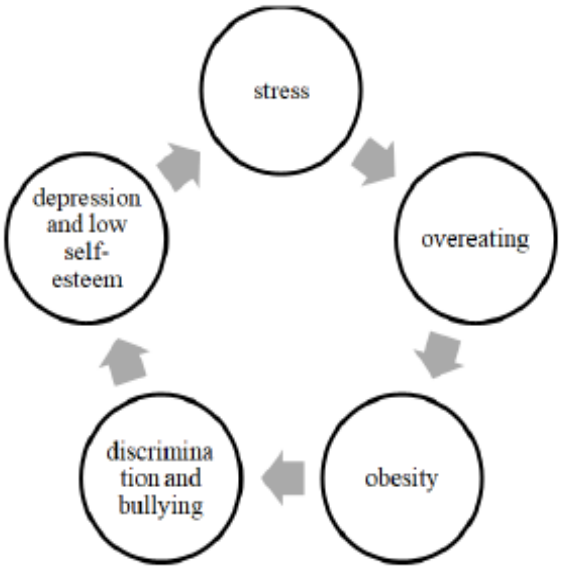

Figure 2. The Closed Circuit between Stress and Obesity

Studies claimed that there is a significant relationship between child sexual abuse (CSA) and the development of eating disorders because the acts of binge eating, purging, or food deprivation are found to relieve stress temporarily and help the patient to get away from the suffered deep pain, sorrow, depression, and all hurting emotions that are resulted from exposure to sexual abuse. Such compensatory behaviours do not relieve the stress of the sexual abuse itself but also help the child to escape from family stress that resulted from their childhood exposure to sexual abuse, to avoid remembering the details of what had happened, and to get away from his continuous fear of such harsh experience's recurrence. Furthermore, binging, purging, and food deprivation help the child to avoid experiencing physiological arousal again after his exposure to sexual abuse. CSA results in plenty of psychological disorders from which eating disorder is considered as post-traumatic compensatory behaviour. Also, social isolation and avoiding participation in activities are found to be adopted by children who are exposed to sexual abuse.

The severity of eating disorders has a positive relationship with the repetition, frequency, and harshness of sexual abuse experience (See Figures 3 & 4). Most adolescents develop bulimia nervosa as coping behaviour after exposure to sexual abuse than the development of other eating disorders as binge eating and anorexia nervosa. Family and social support are critical to helping the child emotionally after his exposure to that accident. That's why studies revealed that the less the support of child's attachment figure, the deeper the negative impact on the child after exposure to sexual abuse [26].

Research revealed that there is a significant relationship between physical and emotional abuse and the development of ED. During performing a survey questionnaire, it was found those children who are exposed to physical abuse such as pushing, hitting, or any type of violence are developing disorders, including ED, more than children who are didn't experience physical abuse. Also, children who suffer emotional abuse such as insulting, bullying, or self-image refusal from their family members and friends are more susceptible to the development of eating disorders than their peers [10]. All types of abuse contribute to low self-esteem, low self-body image, and depression and may contribute to self-

destructive behaviours (See Table 2). The severity of psychological disorders, including ED, differs according to the degree of closure of the person who performed the abuse against the child. Emotional and physical neglect are also considered child abuse. When parents always tell their children statements like 'you should not cry because you are strong', 'don't show your feelings in front of your peers because they will think that you are weak' and 'don't say that you are sexually abused, forget about it, you will be stigmatized'; etc. such statements teach children to conceal their feelings because it is not allowed for them to express their emotions. Such repression pushes children to find out other deleterious outlets in order to get rid of their pain and distress. That's why parents have to create a safe atmosphere for their children in order to help them expressing their feelings freely so as not to seek unhealthy behaviours to be able to cope with their pain.

The research claimed there is a positive relationship between the development of ED and substance abuse, particularly alcohol drinking, as patients who suffered from ACE were found to develop both ED and alcohol use as compensatory behaviours [1] (See Figure 6).

A study [15] found that there is a significant relationship between times spent watching television and the development of ED. The more time spent in front of the media, the higher development of ED as the media always exports the notions of the ugliness of fat people and the extreme beauty of thin girls and muscular boys (SeeFigure5). Such notions press stress on children and adolescents and push them to seek perfectionism that is related to body weight and shape. Moreover, they increase the degree of depression if the adolescent fails to reach the level of beauty according to the presented notions in media. Unfortunately, media distorted the meaning of the real value of humans and diminished the human value in body shape and weight. A study [2] illustrated the relationship between stress and overeating as studies showed that most of the people tend to eat snacks between meals preferring snacks that are high in calories and contain refined carbohydrates such as sweets, juices, hotdogs, burgers, pizzas, cold cuts, sandwiches, alcohols, chocolate bars, large amounts of nuts, and bakery products. Studies found that most people tend to eat such types of snacks when they are under stress more than in normal conditions in order to get rid of stress. Eating such products continuously for long periods of time contributes to resistance of leptin and insulin, which causes dysregulation of feelings of satiety and hunger. Moreover, such products are considered addictive products as a lack of control was exhibited among people when they kept on consuming them, which may contribute to the development of ED.

Treatment

Studies recognized three steps in dealing with unhealthy behaviours that are results of ACE. The first step is avoiding the occurrence of ACE, which is very hard to achieve, but increasing the awareness of families through awareness programs and increasing the activity of responsible institutions to keep in contact with families through calls or visits in order to help them with their children's rearing is integral. Continuity and propagation of such services will help to improve adulthood physical and psychological health.

The second step is avoiding the acquisition of unhealthy behaviours as a response to painful experiences. This will occur through identifying the problem, realizing the roots of the problem, realizing the motives that lead to such acquisition, comprehending the action of contemporary relief or anger discharge through unhealthy behaviours, and giving healthy alternatives to such behaviours.

The third step is the relief from the adopted unhealthy behaviour that had been practiced for a long time. It will occur through changing the bad habit, replacing it with a healthy alternative habit, and treating the deep pain that had lasted

for long periods of time [5]. Counseling, group therapy, family therapy, individual therapy, and increasing awareness between families, children, and schools are significant approaches to achieve treatment [24]. Organizing programs at schools that work on self-esteem, self-confidence, self-respect, and acceptance of the child to himself despite exposure to bullying will contribute to the prevention of eating disorders.

Cognitive-behavioural treatment (CBT) is so effective in dealing with people who suffer from eating disorders. It can be stratified through different steps; psycho-education is integral as increasing both parents' and children's awareness about the nature of eating disorders and their causes will assist in achieving treatment. Moreover, promoting self-determination among children, helping them to put an accomplishable goal, and helping them to be inspectors of their diet and exercise are considered outstanding approaches. Parents' support to the child, counselor support, and rewarding the child when he starts to work in order to achieve his goal are significant [21]. Also, it is important to avoid stimulants such as usual watching of junk food and sweets advertisements as such advertisements increase concern about food. Avoiding spending much time outside the home is important to avoid eating junk food. Also, they have to avoid spending much time watching media as it presents distorted concepts. It is significant to teach children healthy methods to deal with their problems, solve them, and express their negative feelings through writing them and correcting the negative thought with a positive real one. In addition, it is integral to increase the awareness of parents about changing their unhealthy habits that may contribute to their children's relapse. Treatment of psychological disorders and dealing with painful emotions will result in getting rid of eating disorders because ED is simply symptoms that refer to the presence of a deeper problem which is necessary to deal within a healthy way in order to attain successful outcomes.

Treatment of Anorexia Nervosa and Bulimia Nervosa among Children

A study [20] mentioned several ways of treatment. First of them is hospitalization which is necessary for patients who exhibit extremely low body mass index, which may lead to death in case of AN, and the normal weight with extremely excessive purging behaviours that had contributed to physical disturbances in case of BN. Hospitalization is integral for patients who adopt suicidal over-thinking, self-destructive behaviours, deep depression, and deep obsessive-compulsive disorder. Inadequacy of outpatient treatment and the presence of physical problems such as hypotension, cardiac problems, dehydration, severe anemia, or electrolyte disturbance require hospitalization. Inpatient treatment includes supporting the child with three whole, healthy meals per day in which the child has to finish eating his food for 30 minutes and have rest immediately after eating in order to avoid purging behaviours. If the child succeeds in committing such requirements, he would be awarded. It is better for the child to be under the supervision of a nurse to encourage and observe him in order to avoid purging behaviours. After approaching a normal weight in case of AN, stopping purging behaviours, and replacing them with healthy behaviours in case of BN, the child can leave the hospital and start outpatients' treatment under the supervision of his parents. Also, in the case of BN, the adolescent has to stop other coping behaviours like alcohol use or addiction before leaving the hospital. The second treatment approach is partial hospitalization, through which patients attend daily sessions that support them psychologically and support them with healthy dieting, then they go back home and continue their treatment under their parents' supervision. Follow-up is necessary twice or thrice a week, and prolonged follow-up is necessary that lasts for months.

The third treatment approach is an individual psychodynamic treatment that focuses on ego-strength, self-identification, self-esteem, coping skills, the real value of a human regardless of his shape or weight, and the relationship between such beliefs and his eating behaviours. The approach supports the self-determination of the patient and allows him to find solutions by himself instead of receiving solutions by his therapist. It is known as ego-oriented Individual Therapy (EOIT), which is more effective among older adolescents than younger children.

The fourth treatment approach is cognitive-behavioural treatment (CBT) which depends on improving the cognition of the patient, and discussing distorted thoughts, for example, 'one chocolate will contribute to extreme weight gain'. In addition, it is important to discuss and correct the distorted conceptualization that had shortened the real value of a person in his body weight and shape. Such an approach is more effective among older adolescents, but it is found to be less effective among youngsters. CBT is found to be more effective with patients who are deeply depressed because it works mainly on solving problems, anxiety, and behaviours that are related to painful emotions. CBT focuses on teaching patients to deal with their painful emotions in a healthy way. That's why it is significant that social workers should build a trusted and non-judgmental relationship with their patients. Sessions of CBT are supposed to range between eight to 16 weeks, each session is about 45 minutes, and follow-up is necessary [21].

The fifth approach is family therapy, through which the therapist works on increasing the awareness of the family about the nature of ED, relapse, the significance of the immediate calling of the therapist if the patient relapses. Family therapy helps the family to work as one team with their child to achieve better outcomes. The approach works on increasing family awareness of unconditional acceptance and the conceptualization that a human is precious for his own value regardless of his shape or body weight. This approach is known as Behavioural Family Systems Therapy (BFST).

The sixth approach is parents' counselling that supports parents with healthy ways in order to be able to understand their adolescent's emotions and the ways that children express their feelings with even if it was anger. Moreover, the approach helps parents to solve their marital problems that may cause distress to children.

The seventh approach is interpersonal psychotherapy which focuses on difficulties that the patient encounters through his close relationships, such as the relationship between the adolescent and his family or peers. That's why the role of the social worker is to support the patient with healthy ways to deal with his upcoming problems after the elimination of therapy sessions [20].

CBT and IPT are so Effective with Adults and Adolescents

Psychopharmacology is another approach that can be used in ED treatment, particularly when patients suffer deep depression. Antidepressants are found to be effective when used in a parallel way to individual and family therapy. Antidepressants should be used under the physician's supervision as they should be avoided in cases of addiction, severe purging, or severe hypokalemia [20]. Selective serotonin reuptake inhibitors (SSRI) can be prescribed to patients who suffer BN but not described to patients who suffer AN or BED [9]. Medications are not prevalent to be prescribed to adolescents and children. (SeeTable 2).

Treatment of Binge Eating Disorder

Studies claimed that CBT is highly effective in patients who suffer from BED. One of the significant issues that people who experience BED have great concern about is losing weight. That's why dieting programs that assist people in cooking and eating healthy food have a positive impact on both people who are obese

and people who experience obesity with BED. Also, the research found that IPT demonstrates efficacy with some people who suffer from BED. Successful treatment results in decreasing the frequency rate of binge eating behaviour. Medications are not prescribed yet in the case of BED, even if it is accompanied by deep depression [9].

Results & Conclusions

The study claimed that there is a great relationship between adverse childhood experiences and the development of eating disorders during adulthood. ACE can be summarized in terms of physical abuse, emotional abuse, sexual abuse, exploitation, neglect, household dysfunction, and traumatic events. Human adopts compensatory behaviours if he doesn't deal correctly with his stressful conditions and their negative impacts on his emotions. Coping behaviours can be smoking, substance abuse, promiscuity, eating disorders, or others. Eating disorders such as anorexia nervosa, bulimia nervosa, and binge eating disorders may lead to death if untreated. There are different types of treatment that are necessary to achieve relief, such as cognitive behavioural therapy, family therapy, ego-oriented individual therapy, group therapy, interpersonal psychotherapy, and hospitalization in severe cases. It is better to start treatment earlier in order to enjoy relief as human deserves to live happily.

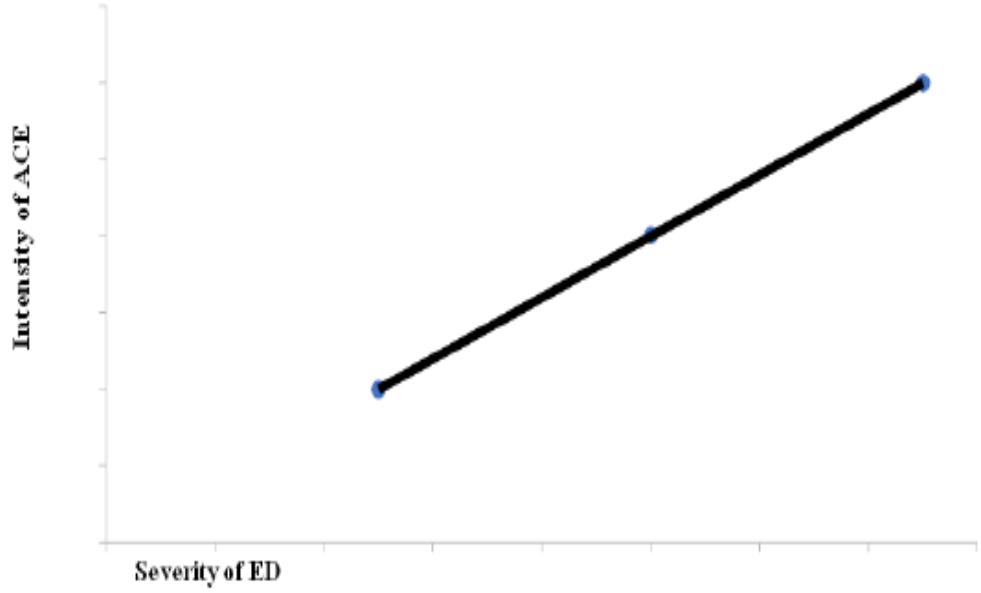

Figure 3. The Relationship between Intensity of ACE and Severity of ED

Table 2. Illustration Figure

	Anorexia nervosa	**Bulimia nervosa**	**Binge eating disorder**
Causes	Adverse childhood experiences (ACE)	-	-
	Genetics		
	Culture		
	Media		
	Stress and depression		
	Personal characteristics		
	Mental illness of parents or children		
	Stress		
	Parents' rejection of their child's body image		
Symptoms	Bodyweight is below BMI	Normal body weight	Overweight
	Avoiding eating and food dislike	Binge eating episodes	Binge eating episodes accompanied by secrecy, shame, and guilt.
		Purging behaviours such as intended vomiting, overuse of laxatives, weight loss pills, and overexercising	
Complications	Anemia	Kidney failure	leptin & insulin resistance
	Very low body weight	Hypokalemia	high cortisol level ➢ Diabetes type two and its complications
	Osteoporosis	Weakness	
	Teeth and bone weakness		
Psychological and physical diagnosis	Depression	-	-
	Anxiety		
	Fear of weight gain		
	Over-concern with weight and body shape		
	Low self-esteem 24		
	Social problems		
	Other coping behaviours as smoking or substance abuse		

	Suicide attempts or thinking		
Treatment	Hospitalization (in case of dangerous complications)	-	cognitive behavioural therapy (CBT)
	Partial hospitalization		interpersonal psychotherapy (IPT)
	Ego oriented individual therapy (EOIT)		Ego oriented individual therapy (EIOT)
	Cognitive behavioural therapy (CBT)		Group therapy
	Behavioural family systems therapy (BFST) and parents' counselling		Behavioural family systems therapy (BFST) and parents' counselling
	Group therapy		
	Interpersonal psychotherapy (IPT)		
	psychopharmacology		

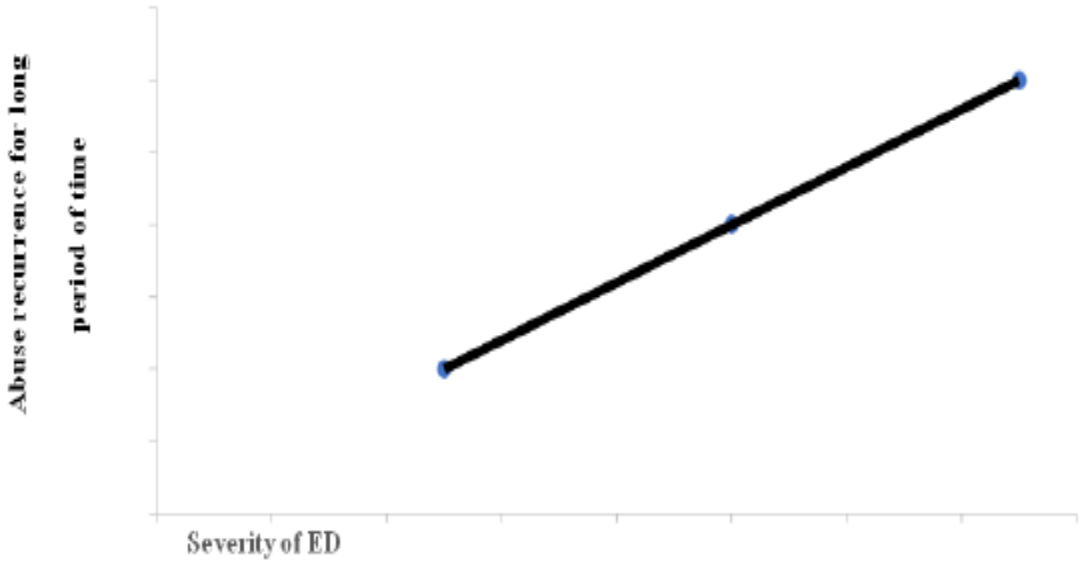

Figure 4. The Relationship between Abuse Recurrence for Long Period of Time and Severity of ED

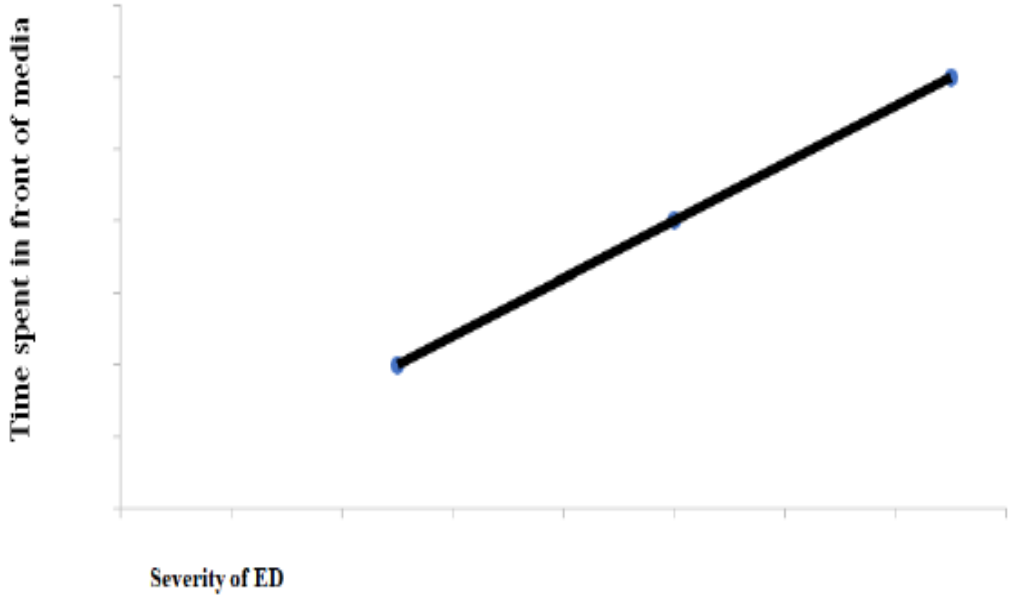

Figure 5. The Relationship between the Time Spent in Front of the Media and Severity of ED

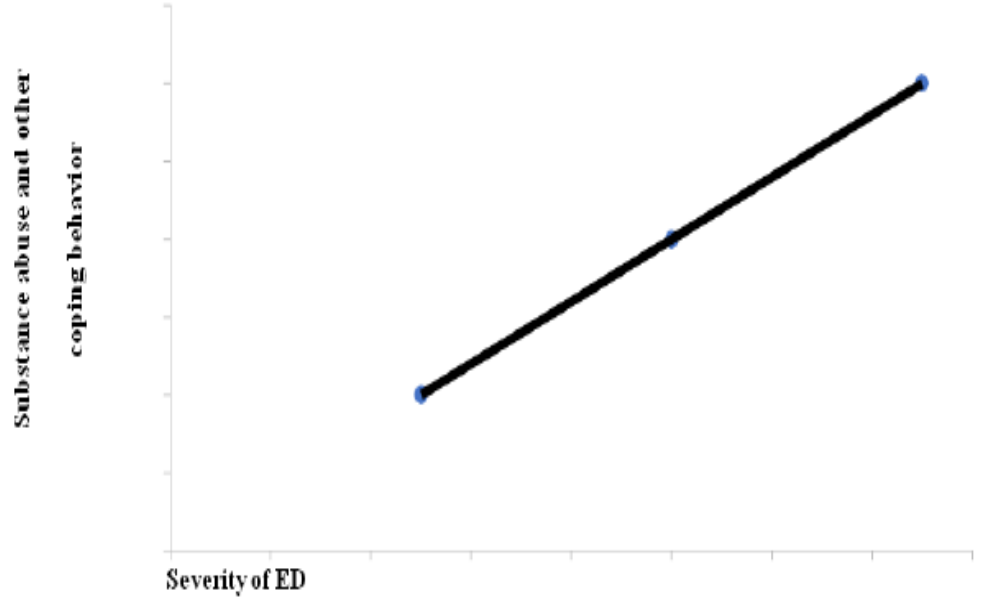

Figure 6. The Relationship between Substance Abuse and Severity of ED

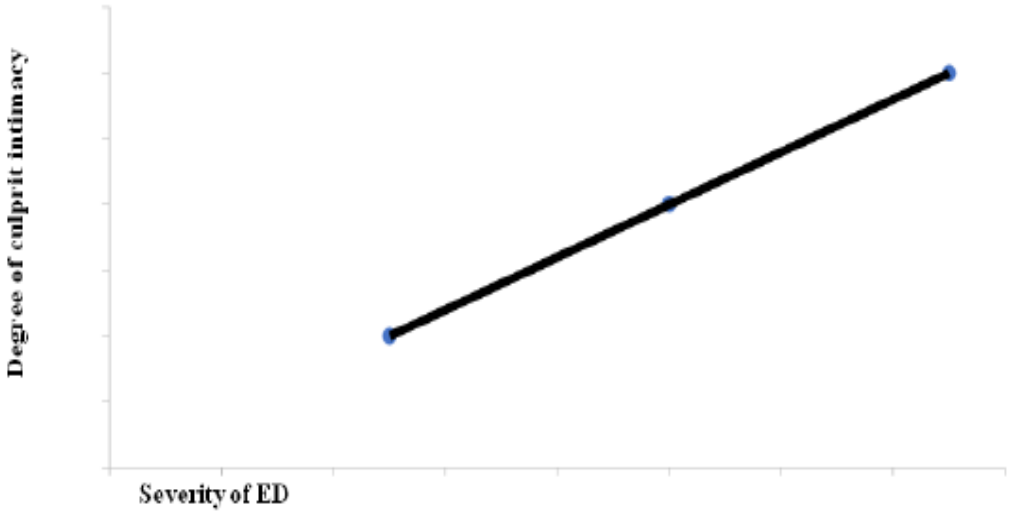

Figure 7. The Relationship between Degree of Culprit Intimacy and Severity of ED

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Author Contributions

MNSS drafted the manuscript. MNSS critically revised the manuscript for intellectual content. The author read and approved the final manuscript. The author is a guarantor of the paper.

Conflicts of interest

None declared.

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Does Gender Matter in the Adoption of Emails in the Namibian Enterprises?

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Abstract

The paper examines if gender matters in the use of emails in the enterprises of Namibia. The paper is based on the usefulness of emails in business organizations, using the Namibia Enterprise Survey data collected from 580 enterprises by the World Bank in 2014/2015 in order to test a null hypothesis that there is no association in the use of emails between women and men top-managed enterprises in Namibia. The paper finds out that there is an association with men in top-managed enterprises using more emails than women's top-managed organizations. This finding signifies the institutionalized gender digital divide in enterprises, signalling the marginal benefit of advantages accruing from emails in the enterprises that are top managed by women. Hence, gender matters.

Keywords*: Emails; Enterprises; Enterprise data; Adoption; World Bank.*

Introduction

The subject of the use of emails among women and men's top-managed enterprises is situated within the context of gender and the adoption of information technologies. The general agreement is that the adoption of information technologies differs by gender and, therefore, that information technologies are not gender-neutral [1-5]. There are various positions in this general agreement of gender un-neutrality in the adoption of information technologies. One position is that males are in a more favorable position of adoption. In the process of a new technology being introduced in school, male teachers gave more consideration to perceived usefulness than female teachers for making decisions regarding the use of new technology. In the same line, using computers, email services, electronic data management systems, e-learning applications, and online stock trading, men are more technologically adept than women, and females face technical challenges and risks in using technology [6]. Another position is that women have tended to be more adoptive of information technologies than men. Women perceived email and instant messaging to be more useful, and they spent more time communicating with others via email and instant messaging than men [7]. Gender differences also happen in social media, mobile or internet banking, and e-commerce, whereby the males and females have different agendas in using social network sites. In contrast, the females mainly use the social network to maintain existing relationships; the males use it to make new friends [8]. From these positions, there is no single position that men or women adopt or not information technologies, but it is the context in which the technologies are used [10]; the support mechanisms, such as government, management, motivation, technology and training, matter in the adoption or not [10].

Emails have become a universal medium for communication within organizations [11]. They are a critical ICT tool in managing information and communication. They allow information flow and sharing in large quantities and simultaneously to multiple recipients, almost instantaneously and at reduced costs [12]. It is one of the most effective business

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communications tools used in virtually all areas of business [13]. It has been shown that reading and answering emails take up to 28% of enterprise workers' time {some other time is for instructions to the specific tasks to employees (39%), searching and gathering information (19%), and communication and collaboration internally (14%) [14]. Email marketing is increasingly recognized as cost-effective for small and medium-sized enterprises (SMEs). The number of companies using email in their everyday communication increases day by day, providing the possibilities for personalized communication, building long-term relations, and willingly giving contact information [15]. Emails, however, have many challenges, among which are email overload, email retention and archiving, email phishing, pharming, virus and spam, multicasting, email addiction, language degradation, and email privacy and security [11].

In a relatively old study trying to find out the different styles of writing emails between men and women [16], it is found out that women and men have different communicative ethics: while the male style of communication is characterized by put-downs, strong contentious assertions, lengthy and frequent postings, self-promotion, and sarcasm, the female style is marked with the expressions of appreciation, thanking, and community-building, as well as apologizing, expressing doubt, asking questions, and contributing ideas in the form of suggestions, on the other hand. Hence, men seem to communicate with more adversity, while women tend to communicate with more supportiveness and attenuation. In the same vein of finding out the differences in email style between female and male students in interaction with their instructor, it is found that the males show a heterogeneous style that depends on the topic. In contrast, females are more consistent in using a structured, traditional written style in correspondence [17]. A study about how gender affects computer-mediated communication in a university setting [18] found that the male faculty overwhelmingly prefer to communicate with students via emails, even though the female faculty receive significantly more emails and respond faster than the male faculty. When a comparison is made on the use of emails between men and women, the results show that women spend more time using emails; that there is no difference between men and women in the use of emails to keep in touch with local friends, but that women used emails more frequently to communicate with people at a distance; that women ranked emails to be more useful than men rated them [19]. Concerning the gender differences in the use and perceived usefulness of email, it was found that women perceive email as more useful than men do when communicating with people who are geographically distant; the men and women use and similarly perceive emails, that there was no statistically significant difference between men's and women's perceptions of email usefulness and frequency of use when communicating with people who were geographically close [7]. In a study to investigate the influence of gender in language utilized in email communication among university lecturers, it was found out that the abbreviations are less standard in female emails, and unlike females, males like to use abbreviations in their emails; about emoticons and onomatopoetic, females like to express their feelings and emotions explicitly, making them more likely to be onomatopoetic and emotional than men [20].

A careful observation of the above empirical studies regarding email use from a gender perspective shows that it cannot be asserted that either women or men use more emails than women or vice versa. The context where the emails are used is likely to determine who uses emails between men and women. However, no study has been done regarding the use of emails, comparing women and men in top-managed enterprises; no study has been carried out on determining whether or not there are gender biases in the enterprises top-managed by women and men. None of the studies has tried to respond to the question of whether or not there is a

significant difference in the use of emails between the women and men's top-managed enterprises.

This study addresses the concern that studies of women and technology are neglected [21]. The study adds theoretical and methodological perspectives on the influence of gender in adopting e-technologies among SMEs; it provides information about how and why gender relates to the likelihood of e-technologies adoption in commercial settings. The findings are essential in order to address the technological gender gaps that gender differences have exacerbated. The results are also bound to inform the public policy goal of a globally equitable information society, with the concern that the e-technologies have become increasingly vital to the many aspects of everyday life globally, hence the need to address the digital divides in gender [22].

More specifically, this study is important because it adds to the literature regarding the gendered dimension of the email used in enterprises among women and men in top-managed enterprises through giving insights to the following questions: Given the background that the digital gender gap is suffered mainly by women [22-26], to what extent is this true regarding the use of emails in enterprises top-managed by women and men? Does the gender gap in digitalization go beyond women's category to even institutions that women manage? Whatever the case, whichever enterprise suffers from the digital gap, whether women or men in top-managed enterprises, recommendations are needed so that the benefits of emails percolate to all the enterprises in Namibia. The small and medium enterprises (SMEs) in Namibia have high business discontinuation of four times higher than the rate of established business activity [27]. Using emails in a gender-balanced manner in enterprises should lead to the benefits of using emails, such as allowing information flow, reducing costs in communication, marketing the enterprises, building long-term relations, and building a database for important contacts.

Methodological Underpinnings

The study uses the Namibia Enterprise Survey data of 2014/2015. The data was collected by the World Bank [28], which used the Manufacturing Module Questionnaires and Services Module Questionnaires to collect data. This standardized survey benefits from a representative stratified sample of firms. Due to such attributes, it is possible to achieve better generalizability of results for Namibia. The sample of this data was selected by the World Bank using stratified random sampling. The target sample size was 600 enterprises, and 469 enterprises were reached. Two levels of stratification were used, namely, the industry and region. In the industry stratification, the universe was stratified into manufacturing industries and two services sectors of retail and other services (see Table 1) for the summary of industry sectors).

The study seeks to determine if there is an association between the use of emails among women and men in top-managed enterprises. The data analysis for this study begins with the description of the profile of the enterprises. This is to understand the key characteristics of the enterprises. The first step towards determining this association is by finding out the extent to which the women's and men's top-managed enterprises use the email facilities. There follows the use of the descriptive statistics by showing the frequencies and percentages of use of emails by women and men in top-managed enterprises. These descriptive statistics help determine where there is more use of emails in case of significant difference in the use. In the third step for data analysis, there is the testing of the null hypothesis that there is no association in the use of emails between women and men top-managed enterprises of Namibia.

The Chi-squared test compares the distribution of the categorical variables of the use of the emails in a sample of women and men's top-managed enterprises. The Chi-squared test tests the following null (H_0) and

alternative hypotheses (H_1), respectively. H_0: Gender has no association with emails, and H_1: Gender has an association with the use of emails. The null hypothesis is rejected if the chi-squared statistic is larger than the critical value from the chi-squared distribution, whose critical values are 3.84, 5.99, 7.82, and 9.49, with corresponding degrees of freedom of 1, 2, 3, and 4, respectively, at an alpha level of 0.5; larger chi-square statistics than these critical values of specific corresponding degrees of freedom lead to the rejection of the null hypothesis of independence and accepting the alternative hypothesis [29].

Findings

Profile of the Establishments

Table 1. Industry Sector

Industry	**Frequency**	**Percent**
Food	29	5.28
Textiles	5	0.91
Garments	11	2
Leather	4	0.73
Wood	10	1.82
Paper	4	0.73
Publishing, printing, and Recorded media	7	1.28
Refined petroleum product	2	0.36
Chemicals	7	1.28
Plastics & rubber	6	1.09
Non metallic mineral products	19	3.46
Basic metals	5	0.91
Fabricated metal products	10	1.82
Machinery and equipment	6	1.09
Electronics	5	0.91
Transport machines	6	1.09
Furniture	34	6.19
Recycling	3	0.55
Construction Section	89	16.21
Services of motor vehicles	40	7.29
Wholesale	10	1.82
Retail	183	33.33
Hotel and restaurants: section H	28	5.1
Transport Section	14	2.55
IT	12	2.19
Total	**549**	**100**

Source: Data analysis from World Bank Namibia Enterprise data 2014/2015

Regional stratification was defined in the three regions of Windhoek/Okahandja, Walvis Bay/Swakopmund and Oshakati/Ongwediva. A sample frame was built using data compiled from local and municipal business registries. Establishments with undefined sizes were included in the sample frame to ensure a representative sample. While in Windhoek/Okahandja region, 196 (42%) establishments were sampled, in Walvis

Bay/Swakopmund region were 144 (31%), and in Oshakati/Ongwediva, 129 (27%). 104 (22%) of the industries were part of larger firms. The legal status of these firms in terms of shareholding is summarized in Table 2.

Table 2. Legal Status of the Firms

Legal status	**Frequency**	**Percent**
Shareholding company with shares traded	7	1.49
Shareholding company with non-traded shares	14	2.99
Sole proprietorship	201	42.86
Partnership	27	5.76
Limited partnership	220	46.91
Total	**469**	-

Source. Data analysis from World Bank Namibia Enterprise data 2014/2015

The ages of the establishments range from less than one year to 121 years by the time of the end of the survey in 2015. The oldest establishment dates as far back as 1894. Table 3 summarizes the number and the periods in which the enterprises in Namibia were established.

Table 3. Periodization of the Enterprise Establishments in Namibia

Establishment dates	**Frequency**	**Percent**
Between 1894 and 1989	30	6.61
Between 1990 and 1999	85	18.72
Between 2000 and 2009	234	51.54
Between 2010 and 2014	105	23.13
Total	**454**	**100**

Source. Data analysis from World Bank Namibia Enterprise data 2014/2015

It is from the 1990s that Namibia witnessed a significant establishment of enterprises. More than half the enterprises that were sampled began in the first decade of 2000, and half of these started in the first five years of the second decade (between 2010 and 2014). By the time when these establishments began, 84% were formally registered. In terms of experience working in the enterprises, the top managers (354, 76%) have experience of more than ten years, 72 (16%) between 5 and 10 years, and 37 (8%) below five years. Among the owners of these establishments, 222 (47%) are women, with 178 (38%) of top managers being female. 364 (78%) of the establishments communicate with clients and suppliers by email, and 205 (44%) have their websites.

Extent of Use of Emails by Women and Men Top-Managed Enterprises

Table 4 presents the results of a Chi-squared test to compare the use of emails between women and men's top-managed enterprises in Namibia.

Table 4: Chi-squared Test Results of the use of Emails between Women and Men Top-Managed Enterprises

Do you currently communicate with clients and suppliers by email?			
Is the Top manager female?	Yes	No	Total
Yes	131 (75.72%)	42 (24.28%)	173 (100%)
No	221 (78.65%)	60 (21.35%)	281 (100%)
Total	352 (77.53%)	102 (22.47%)	454 (100%)
Pearson Chi squared (1) = 0.5260 Pr = 0.468 Cramer's V = -0.0340			

Source. Data analysis from World Bank Namibia Enterprise data 2014/2015

In terms of percentage, it can be inferred from Table 4 that there are more men in top-managed enterprises (78.65%) compared to women in top-managed enterprises (76%) making use of emails.

As shown in Table 5, performing a Chi-squared test on the use of emails between women and men in top-managed enterprises shows a critical value of 0.5260 (which is bigger than 3.84) at the degree freedom of 1 and a precision level of 0.468. Hence, the null hypothesis that gender has no association with emails is rejected, and the alternative hypothesis that gender is associated with the use of emails is upheld. Given that men's top-managed enterprises use more emails (78.65%) than women's top-managed enterprises (75.72%), it can be concluded that the enterprises that men manage use more emails compared to those managed by women.

Discussion

The key finding of this study is that there is more use of emails in men's top-managed enterprises in Namibia. This finding is in syntony with the finding elsewhere that men are more adept in using emails than women [8]. It is also similar to the finding of email in an educational setting, whereby the male faculty overwhelmingly prefer to communicate with students via emails [18]. However, such finding is at odds with findings such as that women find emails to be more useful than men [30, 7], and they use them more frequently than men to communicate at a distance [30].

The contradiction in findings whereby somewhere women use more emails than men, and somewhere else, more men use more emails than women enhances the observation that the context of the use of emails is important to consider. In the case of Namibia, it is crucial to observe the extent to which the support mechanisms from government, management, motivation, technology, and training are critical in the adoption or not of the emails in the enterprises [10]. Even more specifically, in the case of Namibia, to what extent does the gendered triple challenge of inequality, unemployment, and poverty in Namibia [31] influence the adoption of the use of emails by men and women in top-managed enterprises? With the Gender Inequality Index (GII) of position 115 out of 160, gender-based inequality measured through the reproductive health, empowerment, and economic development dimensions is relatively high. Namibia faces an unemployment that has risen from 27.9 to 33.4% between 2014 and 2018. The female unemployment rate was at 24.7% in 2018. In 2018 most Namibians had to live with less than 2 USD per day 2018 and deal with an annual income of less than 100 USD, with female-headed households suffering the most. This triple gendered challenge expresses the inequality gender structure of the Namibian society, which emerges out of culture, religion, and agricultural practices [32]. Does this gender triple challenge impact the use of emails in Namibian enterprises?

In the current way of doing business, there is an unprecedented pressure to become more innovative to stay in business by doing proper self-marketing for the goods and services offered and managing information and business communication. Emails are proving to be viable in marketing [15] and managing information and business communication [12, 13].

Concerning email use in the Namibian enterprises, lack of attention to the promotion of its use risks the increase of the gender digital divide to a digital rapture. Society is getting more digitalized, and the more the enterprises will get into the use of digital technologies, the more they will survive in business and not fall into the typical business discontinuation trap of four times higher than the rate of established business activities [33]. Among the recommendations to support and promote SMEs in the north-eastern regions of Namibia are issues of provision of skills or vocational training, access to market information, a common facility centre, technical advice, and

assistance with the business plan development to obtain loans [33]. Quite a number of these issues can be achieved through the use of email communication.

Conclusion

The study sought to examine the extent to which gender influences the use of emails in the enterprises of Namibia. Gender was reflected in the dynamics of women's and men's top-managed enterprises. The paper results show an association between gender and the use of emails in women's and men's top-managed enterprises: the men's top-managed enterprises use more emails than women's top-managed organizations. This finding indicates the institutionalized gender digital divide in enterprises, signaling the marginal benefit of advantages accruing from the use of emails in the enterprises whose top managers are women. Hence, gender matters in the adoption of emails in Namibian enterprises.

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Declaration of Conflict of Interest

I, the author, Adalbertus Kamanzi, hereby declare that the disclosed information is correct and that no other situation of real, potential or apparent conflict of interest is known to me. I undertake to inform you of any change in these circumstances if any issue arises.

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Exploring Nigeria Annual Budgets and Health Sector Budget Provisions towards Attainment of Universal Health Coverage Amid the Covid-19 Pandemic Preparedness

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Abstract

The Covid-19 outbreak is currently having a significant impact on the health and economic growth of the World. This study explored the trend in Nigeria's annual budget from 2016 to 2020, the assumptions for these annual budgets, the budget allocations to the Health Sector and the policy measures in place for health emergencies. The mixed-method approach was used and involved key informant interviews of 30 employees and 30 top management officials across the Federal Ministries of Health and Finance using a structured interview guide. There were also desk reviews of documents in public domains and government published financial and budget data at global and national levels. The findings reveal that Nigeria has continued to increase her annual budget without much improvement in her revenue position. The key assumptions on which the various annual budgets were based were distinct, and none envisaged the Covid-19 pandemic and its aftermath. On health sector allocation, the Federal Government of Nigeria lays little emphasis on efforts towards the attainment of UHC and emergency health events. The government ensured that health care financing policies and provisions are in place. However, the adequacy of those policies and provisions needs to be improved upon. The past spending pattern between 2016 and 2020 shows that these policies are not directed at closing the scary gap that makes ordinary Nigerians suffer from the overwhelming cost of healthcare. This includes a lack of attention to the basic health fund and funds for emergencies, probably due to inadequate political will and commitment to health.

Keywords*: Budget allocation, Covid-19 pandemic, Emergency preparedness, Health budget, Health expenditure, Universal health coverage.*

Introduction

The current Covid-19 outbreak has been forecasted to have a significant impact on the economic growth of the World, especially in Sub-Saharan Africa. In a Press Release on 9th April 2020, it has been indicated that the economic impact of the coronavirus will be a sharp fall on the economy from 2.4% in 2019 to -2.1 to -5.1% in 2020 [1]. According to Africa's Pulse, this impact will be the first recession in the region over the past 25 years [2]. The existing pattern of impoverishment from health expenditures and the likelihood of not attaining UHC by 2030 has been made worse by the Covid-19 pandemic. Ensuring that all individuals in all communities of a nation can access the healthcare services that they need and when they need them, without facing financial hardship, is crucial to improving the welfare, wealth and ultimately the health of a country's population. It has been noted that unless health interventions are planned to promote equity, efforts to attain UHC may result in improvements in the national average of service coverage while inequalities get worse at the same time [3].

UHC efforts focus on addressing issues relating to "catastrophic spending on health",

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that is, out-of-pocket spending which exceeds a household's ability to pay; (without reimbursement by a third party); and "impoverishing spending on health", which arises when a household is forced to divert spending away from non-medical budget items such as food, shelter and clothing, by an adverse health event to the extent that the expenses on these items is reduced below the level specified by the poverty line. Progress towards UHC does not mean that health care is always free of charge. It means a lowering of barriers to seeking and receiving needed care: for example, out-of-pocket payments, distance, poorly equipped facilities and poorly trained health workers, as such access to needed health services will cause less and less financial hardship; thus, ensuring that people receiving health services do not place their families at risk of poverty, but are still able to afford food and other necessities. Attainment of Universal health coverage (UHC) involves appropriate financial resources to pay for and offset necessary health services. These resources are expected to be raised efficiently and equitably, be pooled effectively to provide financial protection and then redistributed to a manner that maintains equity. Every nation seeks to improve the health status of her citizens by ensuring three aspects of service delivery, namely equity in the use of health services, service quality and financial protection for her citizens. These make the quest for Universal Health Coverage (UHC) very appropriate and require that the emphasis of the goals and objectives of UHC should be targeted at the population and health system as a whole.

There are three dimensions of universal health coverage as in the axes of a cube: population, service and cost [4, 5]. The population axis defines the UHC objective of population coverage in terms of both services and financial protection. The cost axis of the UHC is important to the financial protection objective and needs to be interpreted in terms of capacity to pay for services received, while the service coverage dimension is defined in terms of needed and effective services and comprises of the objectives of guaranteeing that everyone is capable of using the health services needed and that the health services are of good quality. These dimensions of population, service and cost connect precisely to health financing policies related to UHC and the monitoring. According to [6], the goal of universal coverage, therefore, requires some fiscal commitment from the government, as well as pooling and redistributive mechanisms that ensure financial protection and equitable subsidization of coverage for the poor. It has been reiterated that fiscal resources are limited, so expenditures should be managed carefully to get the most value for money, especially for most people with access to the highest quality services and with the most financial protection possible within the available resource envelope [6].

Nigeria, with a population of 195,874,740 million (51% males and 49% females) in 2018 [7], has been shown to have among the highest out-of-pocket health spending and poorest health indicators in the world. According to [8], data available shows that there is a long way to go to achieve Sustainable Development Goal 3.8.2 (Universal financial protection) by 2030. Universal health coverage (UHC) means that all people are enabled to receive the health services they need, including public health services designed to promote better health, prevent illness, and to provide treatment, rehabilitation and mollifying care of appropriate quality and effectiveness while ensuring that the use of these services does not expose the user to financial hardship as captured in the Sustainable Development Goals (SDG) 3., Target 3.8; indicators 3.8.1 and 3.8.2.

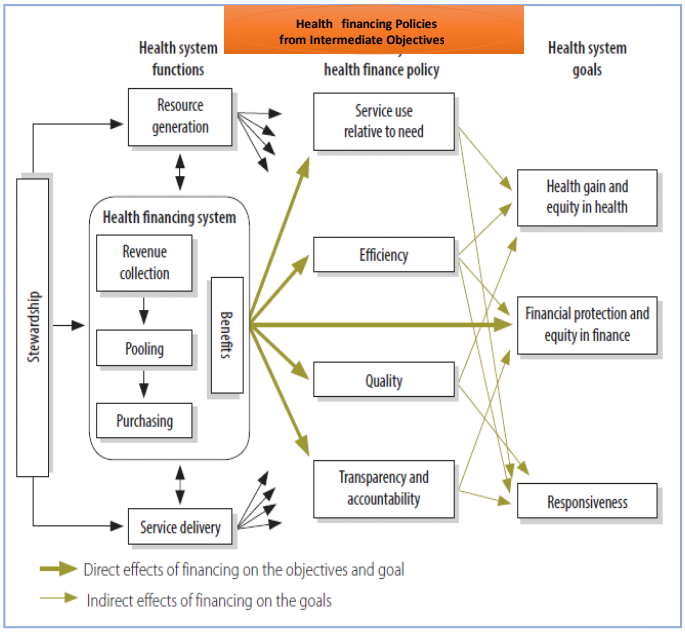


Figure 1. Health System Structures, Health Policy Objectives and Health System Goals

Consequently, the general challenge for health policy is reflected in the way the health system operates (i.e., the health reforms) to improve the UHC goal attainment. The connections between the system structures and the health system goals concern each of the four functions of service relative to needs, efficiency, quality, transparency, and accountability (separately and together), and ultimately the way in which these financing functions influence the attainment of the goals and targets of health financing policy actions, as in figure I below.

According to [9], one important concept illustrated in the figure is that the health financing system does not act alone in affecting the intermediate objectives and final goals; coordinated policy and implementation across health system functions are essential for making progress on the desired objectives, such as improving the quality of care. However, for any health financing policy to be associated with these efforts towards UHC, health system reforms are required to improve service coverage, equity in health resource distribution; efficiency; and transparency and accountability. Hence, this study explored the status of health financing policies (As defined in the Nation's Annual Budgets – 2016 to 2020) towards the attainment of universal health coverage amid the Covid-19 Pandemic. The specific objectives were to:

1. Assess the trend in Nigeria's annual budget (Revenue and Expenditures) from 2016 to 2020.
2. Ascertain the assumptions on which these annual budgets were based.
3. Determine the proportion of the Nation's annual budget (2016 to 2020) that went to the Health Sector.
4. Ascertain the policy measures (as regards budgetary provisions for health contingencies) in place to manage the Covid-19 pandemic.

Health financing comprises of three interconnected functions: mobilization and collection of funds, pooling of prepaid funds, and allocation of resources, including purchasing and paying for services [10].

Health financing has been recognized as one of the structural parts of health systems for the achievement of improved health outcomes, equity, and public satisfaction, and as such plays an essential role in universal health coverage [11, 12]. Health financing functions need to be supported by transparent legislation and regulations with implicit policy options that ultimately promote sustainability of revenues, ensure risk pooling arrangements, and

rationalize health spending both in the public and private sectors [13-15]. According to [16], the success of the various health financing methods can be assessed by the overall effects on equity of access and health outcomes, revenue generation and efficiency, and the effects on the user and provider behaviour.

Studies of perception are valuable in the development and/or revision of evidence-based policies and strategies, thus, contributing to available lessons that will inform and support overall health sector planning, especially the health financing policies and strategies. As Nigeria commits to strive toward the attainment of universal health coverage, The findings of this study will contribute immensely to knowledge on how much priority is given to health by the government in the budgetary provisions; and the development of the advocacy packages to relevant stakeholder groups at various levels of government, which is needed to reinforce efforts towards attainment of UHC. The findings from the study will help policy makers to prioritize challenging demands; make coherent and appropriate choices, thus adapting their approaches to local conditions. This will facilitate making better policy decisions by the governments, even in the face of challenges. The findings will provide the basis for realistic estimates of resources required in the health sector since this is one of the steps towards ensuring that representative investments are made, thus bringing broader socioeconomic development benefits to the country.

The study was limited to the Federal Ministries of Health and Finance among the willing officials/staff of these Ministries to gather information concerning health care financing and the perception on the progress towards attainment of UHC. Furthermore, the search for relevant literature on the key variables was confined to only the English-language literature, while more bodies of knowledge that could have added useful insights would have existed in other languages. It is also worthy of note that the analyses on budgetary provisions was based on documents available mainly online, with a few clarifications called for where needed. Secondly, the analyses will be limited to, only the approved budget for the years under study, which had nothing to do with the actual budget releases and expenditures.

Budget assumptions are based on beliefs and presumptions of anticipated income and expenses. Reasonable budget assumptions usually start with creating budget numbers to work with for planning purposes either from the very first time or basing assumptions on the reality of the current time considering the previous experiences. Budget assumptions are usually based on:

1. Money being expected (Expected Income or revenues).
2. Expenses to be made (Expected expenditure).
3. Potential hitches or challenges during budget execution.
4. Miscellaneous monetary provisions for likely changes.

Health budgets, as characteristically included in the overall government budget, are not just simple accounting tools to communicate revenues and expenses; instead, these are critical positioning manuscripts, stating the main financial objectives of a nation and the nation's real commitment to implementing its health policies and strategies as in the commitment towards the attainment of UHC. A necessary condition to enable the effective implementation of health financing reforms toward the attainment of universal health coverage is robust public budgeting in the health sector. A major reliance on public, compulsory, prepaid funds is necessary to make progress toward universal health coverage (UHC). The Abuja Declaration of 2001 recommended that governments allocate 15% of their budgets to the health sector [17], though the basis for this figure is not obvious, and is without explicit connection to achieving a certain level of health system performance. An indicator that is increasingly used and which builds on the Abuja Declaration target is the

amount a Nation expends in terms of public spending on health as a % Gross Domestic Product (GDP), which captures both the priority given to health in budget allocations, as well as the fiscal context, (How large government is relative to the economy), measured in terms of "total public spending as % GDP" [17]. Improving the quality of budgeting systems in the health sector can support the effective implementation of health financing reforms towards UHC because this is likely to improve predictability in the sector's resources, which in turn increases the likelihood that defined plans can be translated in policy actions on the ground [18]. If the health budget is formulated according to goals and the execution rules align with this logic, it will allow a certain degree of spending flexibility and make budgets more responsive to sector needs; and ultimately, these "outputs" can support better transparency, accountability, efficiency and equity in the use of public resources, all directly contributing to progress towards UHC [19].

Strengthening frontline health care services for pandemic response and the current priority from governments given the Covid-19 virus outbreak requires supportive health financing policies [20]. The guidance on health financing policy is hence ultimately focused on strengthening health system resilience, health security and universal health coverage (UHC) [20]. Every country in the world is affected by the Covid-19 pandemic, unfortunately, in many countries, investment in preparedness was not been sufficiently prioritized in recent years or in the weeks since the Covid-19 pandemic began [21], and thus the elimination of financial blockades to health services to enable the timely diagnosis and treatment of Covid-19 for all who need them without financial difficulties is recommended [21].

Materials and Methods

Data collection tools, namely interview and data collection guides, were used. The study is mixed-method exploratory study where 60 staff of the Federal Ministries of Health and Finance were interviewed. The 60 participants were selected using convenience sampling, and data were collected from the selected participants using a structured interview guide. In addition, using the data collection guide, the reviews of existing documents in the public domains for data with the contents relevant for the research questions were conducted. The Nation's health financing policy documents and reports from the budget office from 2016 to 2020 were systematically examined and analyzed.

The documents examined provided data on annual budgets, the assumptions on which each annual budget was based, the percentage allocation to the health sector and the most recent policy provisions made by the Nigerian government regarding Covid-19. The WHO, World bank and IMF library databases were some of the websites visited with search engines and words like financial policy, public health financing, UHC, Nigeria's annual budgets for 2016 to 2020, provisions for emergency health events, health sector and basic Health Funds in the Nigeria annual budgets. The data generated through the reviews of these documents and responses to the questionnaire were analyzed using Microsoft excel document and presented in tables and graphs/charts. Data were collected from September to November 2021.

Results

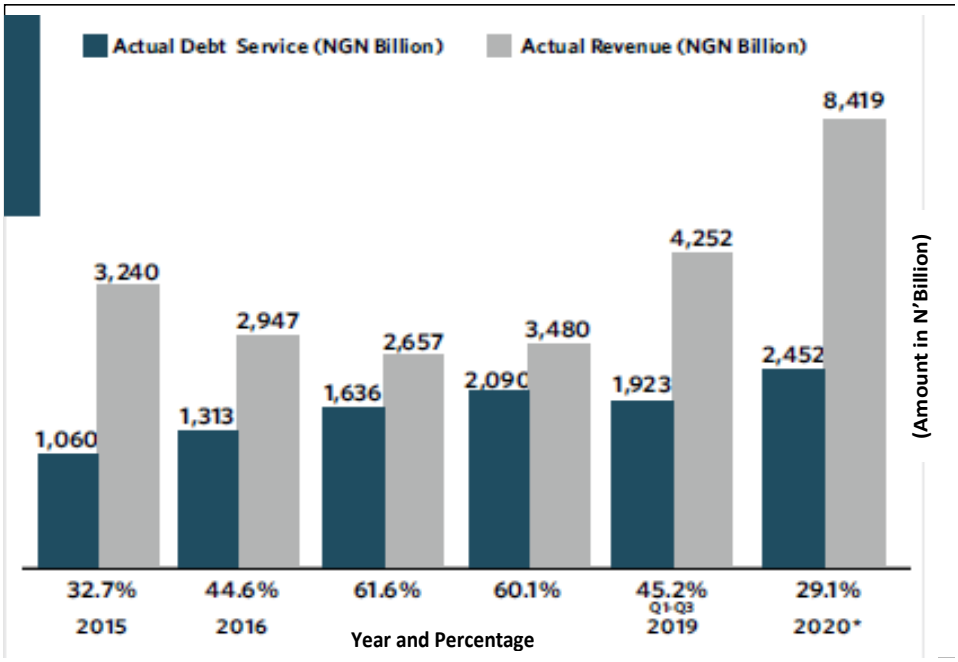
Trend in Nigeria's Annual Budget (Revenue and Expenditures) - 2016 to 2020

The findings show that since 2016, Nigeria has continued to increase her annual budgets, with the development of annual budgets that rise from year to year as can be seen in Table 1 below, though without much improvement in her revenue position. This is evidenced from her revenue-to-GDP rate, which has remained less than 8% from 2016 to 2020 [22].

Table 1. Nigeria Annual Budget (Revenue and Expenditure) in Naira from 2016 to 2020

		Revenue (100%)		**Expenditure (100%)**			
Years	**Total Budgeted**	**Revenue (%)**	**Deficit (%)**	**Capital (%)**	**Recurrent (%)**	**Debt Servicing (%)**	**Statutory Transfers (%)**
2016	**6.06tn**	3.86tn (64)	2.2tn (36)	1.59tn (26)	2.65tn (44)	1.48tn (24)	354.1bn (6)
2017	**7.44tn**	5.085tn (68.4)	2.35tn (31.6)	2.36tn (31.7)	2.99tn (40.2)	1.663tn (22.3)	434bn (5.8)
2018	**9.12tn**	7.17tn (78.6)	1.95tn (21.6)	2.87tn (31.5)	3.51tn (38.5)	2.2tn (24.2)	530bn (5.8)
2019	**8.92tn**	7.00tn (78.5)	1.92tn (21.5)	2.09tn (23.5)	4.18tn (46.9)	2.14tn (24)	502bn (5.6)
2020	**10.6tn**	8.42tn (79.4)	2.18tn (20.6)	2.47tn (23.3)	5.11tn (48.3)	2.45tn (23.1)	560bn (5.3)

Source: Budget Office [22]



Source: Budget Office

Figure.2. Budgeted Debt Service and Revenue

Furthermore, the trend in allocations to Debt servicing and revenues, which attempted to improve from 44.6%, and 61.6% in 2016 and 2017, with a slight fall to 60.1% in 2018, suddenly crashed again to 29.1% in the year 2020 with allocation rate of 45.2% in 2019 [22] as shown in Figure 2.

Statutory allocations were made to some Institutions without any consideration for the Basic health care services (Primary Health care services and/or National Healthcare Scheme) of the Nation. The Institutions that got the annual statutory transfers allocations at least for most of the years include:

1. National Assembly.
2. National Judiciary Council.
3. Universal Basic Education.
4. Niger Delta Development Commission.
5. INEC National.
6. Public Complaints Commission and,
7. Human Right Commission.

However, in 2020, Basic Health Care Provision Fund (BHCPF) and North-Eat Development Commission had allocations made to them. The details are as in Table 2 below.

Table 2. Allocations to Statutory Transfers in Nigeria Annual Budgets from 2016 to 2020 (N'Billions)

	2016	**2017**	**2018**	**2019**	**2020**
National Assembly	115	125	139.5	125	128
National Judiciary Council	70	100	110	110	110
Universal Basic Education (UBE)	77.11	95.19	109	110.9	111.8
Niger Delta Development Commission	41.05	64.02	115.9	85.1	80.9
Independent National Electoral Commission, National	-	45	45.5	45.5	40
Public Complaints Commission	-	4	7.5	4.2	4.7
Human Right Commission	-	1.2	3.01	1.5	2.5
Basic Health Care Provision Fund (BHCPF)	-	-	-	-	44.5
North-East Development Commission	-	-	-	-	38.1

Source: Budget Office [22]

Key Assumptions on which these Annual Budgets were based

The findings show that the 2016 Budget, inaugurated as the Budget of Change, was the first full year budget of the Buhari Administration, prepared against the background of change, implying an overall slowdown in economic growth and a gigantic decline in crude oil prices. Similarly, each ensuing year had a christened name that tried to depict the background or the theme/idea guiding and directing the budget for the year. The year 2017 was named Budget of Economic Recovery and growth; 2018 is known as Budget of Consolidation; 2019 was baptized Budget of Continuity, and 2020 named Budget of Sustaining Growth and Job Creation. None envisaged the Covid-19 pandemic and aftermath on the motto for 2020 regarding sustaining growth and possibly job creation.

Table 3. Key Assumptions and Macro-frameworks for 2016 to 2020 Annual Budgets

Aspects of Economy	2016	2017	2018	2019	2020
Oil Production (mbpd)	2.2	2.2	2.3	2.3	2.18
Oil Price ($/b)	38	52.5	51	60	57
Exchange rate (₦/$)	197	305	305	305	305
Inflation rate (%)	9.81	15.74	12.4	9.98	10.81
GPD Growth rate (%)	4.3	2.5	2.1	3.01	2.93

Source: Budget Office [22]

Other key considerations for each year's budget are as in Table 3. The key assumptions and macro-frameworks for 2016 to 2020 provided the information on which budgets were developed. While oil production remained relatively stable in the period under review, there were increases in the price between 2016 and 2019, with a fall from $60 per barrel in 2019 to $57 per barrel in 2020, probably due to the theme for the year 2020 which is aimed at sustaining growth. The official exchange rate had remained stable at ₦305/$ at least on paper. The inflation and Gross Domestic Product (GDP) rates had not been stable or the pattern predictable.

Proportion of the Annual (2016 to 2020) Budget Allocated to the Health Sector

The 2020 health budget has witnessed one of the highest budgetary allocations to the health sector over the last five years [22]. The percentage of the total annual budget that went to the health sector in 2020 was 4.16%, and this is second to the 2019 percentage allocation to the health sector of 4.18% [22].

Table 4. Budget Allocation to Health as a Percentage of Total Annual Budgets

Year	**Total Annual budget ₦'Trillion**	**Allocation to Health Sector ₦Billion**	**% Total Budget Allocated to Health (%)**
2016	6.06	250.06	4.13
2017	7.44	308.46	4.15
2018	9.12	340.46	3.73
2019	8.92	372.7	4.18
2020	10.6	441.0	4.16

Source: Budget Office [22]

In 2016, ₦250.06bn (4.13% of the total annual budget) was allocated to the health sector out of the total budget of ₦6.06tn. In 2017, a slight increase of 4.15% (₦308.46bn) of the total annual budget of ₦7.44tn went to the health sector [22]. In 2018, though the total annual budget increased from ₦7.44tn in 2017 by ₦1.68tn to ₦9.12tn, the percentage allocation to

the health sector decreased to 3.73% (₦340.46bn out of the annual budget of ₦9.12tn) [22]. In 2019, the percentage allocation came up to 4.18% (the highest in the last five years), being ₦372.70bn out of the total budget of ₦8.92tn [22]. Similarly, in 2020, of the total budget of ₦10.6tn, ₦441.00bn (4.16%) was allocated to the health sector [22].

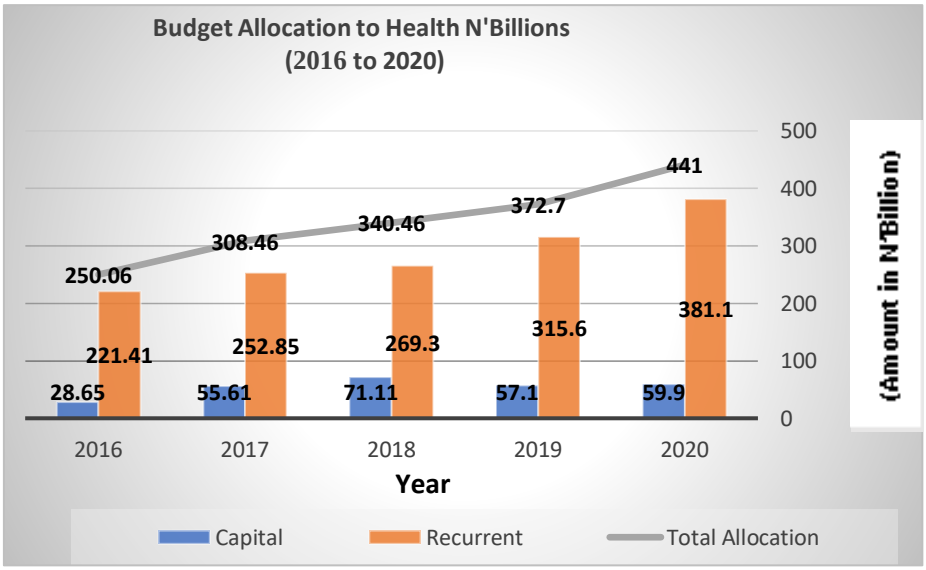


Figure 3. Budget Allocation to Health N'Billions (2016 to 2020)

The Nigerian government allocations to the health sector in 2020 appeared to have peaked to ₦441bn, with ₦381.1bn (86.42%) for recurrent expenditure and ₦59.9bn (13.58%) for capital expenditure [22]. The 2020 budget also made provision for ₦44.5bn for Basic Health Care Provision Fund [22]. However, with the current Covid-19 pandemic, there will be a need to either revisit the budget with a more realistic review based on the current situation or the country might get into borrowing from external sources. An analysis of the budget allocations to the health sector from 2016 to 2020 reveals that budgets for recurrent expenditures have always been higher than that of capital expenditures showing the level of federal government commitment to the quality and sustainability of the health systems and structures toward the attainment for the UHC.

The policy Measures for Emergency Health Events (e.g., Covid-19) and Budgetary Provisions for Health Contingencies

The findings show that there are measures laid down in the National Health Act of April 2011, and that Nigeria is one of the African Union countries that pledged to set the target for allocating funds for the health sector at a minimum of 15% of the total annual budget for each year. There are also Nigeria's national health policy and the Nigeria health financing policy. All these documents provide the framework for the attainment of universal health coverage.

Moreover, some sections of the document made provisions for health emergencies in the event of any occurrence.

According to [23], the Nigeria's Policy Responses to the Covid-19 Pandemic as of April 2, 2020, were:

a. On the fiscal policy, the government has outlined the following:

   1. The release of Contingency funds of ₦984 million ($2.7 million) to Nigeria's Center for Disease Control, with the distribution of an additional ₦6.5 billion ($18 million) for the purchase of more testing kits, the opening of isolation centers and the training medical personnel.

2. The release of a Grant of ₦10 billion ($28 million) to the Lagos State to increase its capacity to contain the outbreak.

3. Her decision to review the 2020 budget and the government's announcement to cut/delay non-essential capital spending by ₦1.5 trillion (close to 1 percent of GDP). This is ensuing from the likely big fall in oil revenue.

4. The design of a fiscal stimulus package to provide relief for taxpayers and incentivize employers to retain and recruit staff during the downturn, including the introduction of a waiver for the importation duty for pharmaceutical firms.

5. A reduction in the regulated fuel prices and the introduction of an automatic fuel price formula to ensure fuel subsidies are eliminated.

b. On the monetary and macro-financial policy, the Central Bank of Nigeria (CBN) through maintaining its current monetary policy rate as at March, has introduced additional measures, which include:

1. Reduced interest rates on all CBN-related interventions from 9 to 5 percent, with the introduction of a one-year moratorium on CBN intervention facilities.
2. The creation of an ₦50 billion ($139 million) targeted credit facility; and
3. The Liquidity injection of ₦3.6 trillion (2.4 percent of GDP) into the banking system, including ₦100 billion to support the health sector, ₦2.0 trillion to the manufacturing sector, and ₦1.5 trillion to the real sector to impacted industries.
4. The introduction of the Regulatory forbearance to restructure loans in impacted sectors.
5. The coordination of a private sector special intervention initiative targeting ₦120 billion ($333 million) to fight Covid-19.

c. On exchange rate and balance of payments policy, the government has:

1. Adjusted the official exchange rate by 15 percent, with an ongoing unification of the various exchange rates under the investors and exporters (I&E) window, Bureau de Change, and retail and wholesale windows.
2. Committed to let the I&E rate move in line with market forces, with a few companies (pharmaceuticals) being identified to ensure receipt of FX and naira funding.

Discussion

Since 2016, Nigeria has continued to increase her annual budgets, with the development of annual budgets that rise from year to year, without much improvement in her revenue position. This is evidenced from her revenue-to-GDP rate, which has remained less than 8% from 2016 to 2020 [23].

Trend in Nigeria's Annual Budget (Revenue and Expenditures) - 2016 to 2020

The challenges that Nigeria continuously experiences in her annual budgets are primarily out of the lack of ability to apply controls and efficiency to her expenditure to match the revenue regardless of any institutional interest. For instance, there have been no significant reductions in the annual allocations to overheads and the so-called albeit opaque statutory spending; rather, the annual budget allocations to these have continued to increase. Moreover, rather than improving on the revenue-to-GDP rate to upset the expenditure pattern, the Federal Government of Nigeria has resorted to borrowing from the Central Bank of Nigeria (CBN) huge sums of money for the unfunded deficit budget. This is seen as an unfunded deficit because the patterns of the recurrent expenditure component of the budget show reoccurring inability to counterbalance the deficit.

It is worthy of note that the Statutory transfers for 2018 were higher than the previous years, probably in preparation for the Country's elections that took place in 2019. Remarkable also is the fact that aside for the Transfers to the National Judicial Council that remained same

from 2018 to 2020, and the Transfers to the UBE that kept increasing over the years, other statutory transfers dropped in amount after 2018. However, there were two additional provisions in the statutory transfers, and these are to the Basic health Care Provision Fund and the North-East development Commission.

While one might get a bit excited in the initiation of statutory transfer of ₦44.50 billion by the Federal Government for the Basic Health Care Fund in the 2020 annual budget, that amount still fall short of what should be provided in accordance with the National Health Act (2014). The Act stipulates that the Federal Government should allocate at least 1% of the Consolidated Revenue Fund (CRF) for BHCF, which should have amounted to about ₦81.55 billion. Going by the Act, this implies that the statutory transfer of the 1% Consolidated Revenue Fund (CRF) has been cut by half.

Key Assumptions on which these Annual Budgets were based

Certain distinctions are observable in the emphasis placed on certain aspects of the budget across the years and could have been as a result of the differences in the background and the key assumptions on which the various annual budgets were based during their development. It is known that reasonable budget assumptions usually start with creating budget numbers to work with for planning purposes either from the very first time or basing assumptions on the reality of the current time considering the previous experiences. As has been the practice, budget assumptions are usually based on:

1. Money being expected (Expected Income or revenues).
2. Expenses to be made (Expected expenditure).
3. Potential hitches or challenges during budget execution.
4. Miscellaneous monetary provisions for likely changes.

For instance, the 2016 Budget, inaugurated as the Budget of Change, was the first full year budget of the Buhari Administration, prepared against the background of change, implying an overall slowdown in economic growth and a gigantic decline in crude oil prices. It was based on the Zero-Base Budgeting (ZBB) principle, a departure from the traditional incremental Budgeting approach that simply adjusts (usually upward) amounts included in the previous budget. This implied that Ministries, Departments and Agencies (MDAs) would justify every item of revenue and expense in the budget.

Proportion of the Annual (2016 to 2020) Budget Allocated to the Health Sector

The 2020 health budget has witnessed one of the highest budgetary allocations to the health sector over the last five years. The percentage of the total annual budget that went to the health sector in 2020 was 4.16%, and this is second to the 2019 percentage allocation to the health sector of 4.18%.

On financing of health care, Heads of States of African Union countries met in April 2001 and promised to set the target of health allocating at least 15% of their annual budget to ensure improvement in the health sector [24, 25]. 19 years after signing the 2001 Abuja Declaration on adequate funding for the health sector, Nigeria is yet to come anywhere close to the 15% target set by the Declaration. Total expenditure on health by the government shows that the Federal government has, over the years, budgeted less than 5% on the health sector, far below the target during the Abuja Declaration. This failure by the federal government to adequately fund the health sector reveals a failure in political commitment to improving the quality of healthcare in the country, in spite of the rising healthcare concerns.

It is important to note that during the period under review (2016 to 2020), recurrent expenditure has accounted for 79 to 89% of the proposed allocations to the health sector, leaving expenditures on capital components in the barest minimum (11% to 20%) of the health budgets.

Although primary health care has remained the fulcrum of the Nigerian health system, the provision, financing, and management of primary health care services, as well as secondary health care services, leaves much to be desired. Furthermore, of deeper interest is the fact that the health sector budgets have not been putting into consideration some of the provisions in the 2014 National Health Act, especially regarding procurements, the provision of a basic minimum package of health facilities and the National Health Insurance Scheme. The implication is that efforts toward UHC are being grossly neglected.

A closer analysis so far on budget allocation to the health sector (2016 to 2020) confirms that the Federal Government of Nigeria lays little emphasis on funding of health strategies towards the attainment of UHC and emergency health events. For instance, while the annual budget allocation to health has never met the Abuja declaration of 2014 target of 15%, there was not consideration for either the UHC or emergency health events as priorities during the period (2016 and 2020) analyzed.

The Policy Measures for Emergency Health Events (e.g., Covid-19) and Budgetary Provisions for Health Contingencies

The findings show that there are measures laid down in the National Health Act of April 2011 and that Nigeria is one of the African Union countries that pledged to set the target for allocating funds for the health sector at a minimum of 15% of the total annual budget for each year. As has been noted, strengthening frontline healthcare services for a pandemic response and the current priority from governments given the Covid-19 virus outbreak requires supportive health financing policies [20]. The guidance on health financing policy is hence ultimately focused on strengthening health system resilience, health security and universal health coverage (UHC) [20]. The availability of the policies not with standing these federal government policies are not targeted at closing the scary gap that makes ordinary Nigerians bear the burden of health care. This impoverishes the populace more and makes nonsense of the effort toward UHC.

Conclusion

The findings reveal that the Nigerian government has ensured that different policies and provisions are in place to address health care financing. However, the adequacy of the policies and provisions might need to be examined further. The investigation on the revenue and expenditures patterns from 2016 to 2020 with the assumptions made while developing the budgets, the health sector allocation in the various annual budgets, and the provisions made for health protection, especially in health emergency events, as is currently the case for Covid-19 showed varied outlooks. These analyses of the findings and results are based on the approved budgets over the years (2016 to 2020) and not on actual.

Conflict of Interest

There is no conflict of interest associated with this study.

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New E-Technologies and Practices Adoption Framework (Ne-TPAF) Dealing with the Crucial Times

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Abstract

The study investigates into the factors influencing the adoption of e-HRM technologies in order to propose a framework for the adoption of new e-technologies and practices during critical times of disruption, uncertainty, complexity, and ambiguity, as is with the case of the Covid-19 pandemic. Through the identification of the factors that influence the adoption of e-HRM technologies in one of the biggest commercial banks in Tanzania, the paper proposes a new e-Technologies and Practices Adoption Framework (Ne-TPAF) in order to promote the adoption of new e-technologies and practices during and after the abnormal times.

Keywords*: Adoption, Critical times, e-HRM, e-technologies, Influential factors, Ne-TPAF.*

Introduction

The concept of electronic, human resource management (e-HRM) is synonymously used with terms such as e–human resource, human resource intranet, HR portal, web-based HR, virtual HR, computer-based human resource management systems, self-service, business-to-employee (B2E), and HRM e-service [1]. E-HRM is a way of implementing HR strategies, policies and practices in organizations through conscious and directed support of web-based technology channels, computer hardware and software, and electronic networking resources [1-4]. E-HRM is intended to facilitate the function of human resource management in the areas of planning, job analysis, recruitment and selection, training and development, performance management, compensation, and reward management, to mention but a few. E-HRM is, hence, a composite of technologies and practices. The increase in the adoption of e-HRM is aimed at achieving administrative and strategic benefits. For example, 70% of European companies used the Internet to deliver human resource services to their employees [5]. While 40% of the companies in Sri Lanka allocated more than 5% of their overall budget to e-HRM developments, in India, the extent of use of the Internet and Intranet to carry on human resources activities is above 82% [6].

Literature has pointed to factors that are responsible for the adoption of technologies. The size of the organization, with large organizations having greater ease in adopting technologies compared to the small ones [7], the top management support to interpret technologies favourably [8], top management commitment and positive attitude on ICTs adoption [9-11], financial availability [7, 12-14]. Individual factors are also essential determinants of adoption of technological innovations. Such factors are the individuals' cognitive interpretations of innovation in relation to themselves [15]. These individual factors include perceived usefulness [14, 16, 17], perceived ease of use [17-19], personal innovativeness, ICTs skills [1, 10, 19-21], user familiarity [15, 22-25], enjoyment of innovation [26], and social influence [15, 27, 28]. Quite a number of environmental factors influence the adoption of technologies, among which industry pressure in operational practices [29], growing

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competition to reduce cost, serve a more strategic role, and manage the employees better [10], and cultural factors [4].

Although technology is crucial during critical human times, and that is when innovations come up, theorization and research during these hard times of Covid-19 and human resources management technologies are almost inexistent. It is argued that the "Covid-19 has grandly shaken all organizations, creating a complex and challenging environment for managers and human resource management (HRM) practitioners, who need to find ingenious solutions to ensure the continuity of their companies and to help their employees to cope with this extraordinary crisis" [30]. Actually, "the spread of Covid-19 creates disruption, uncertainty, complexity, and ambiguity in all organizations" [31]. Performance management amid the Covid-19 pandemic is one of the greatest challenges due to workplace isolation, lack of communication, family distractions, role overload, and occupational stress factors (role ambiguity, role conflict, career, and job control) mainly among employees working from home [16, 30]. To make matters worse, employees' performance during remote working has been left to the subjective understanding of managers of how and what is required to manage a remote team [32]. Additionally, some managers are against remote working because they consider it negatively affects the employees' performance; this is an attitude that leads to micromanagement, perceived by employees as a lack of trust toward them [32], and hence a breeding ground for tension between employees and supervisors. Such are hard moments for organizations, and hence a need to adopt technological innovations to manage human resources. During such circumstances of hard moments caused by the Covid-19 pandemic, e-HRM is crucial for organizations; even with the settling new normal, remote work is becoming a predominant ethos, hence demanding more e-HRM-based technologies and practices.

This study, therefore, contributes to the theory and research on the adoption of new e-technologies and practices during the hard times, such as these times of the COVID-19 pandemic, by proposing a framework for the adoption of new technologies and practices. The study begins by making use of the Innovation Adoption Model [15] in order to develop 18 (eighteen) factors (see Table 1) that are considered to influence for technology adoption. In this model, there are three categories of influential factors: the organizational, individual, and social factors. The factors include training management support and incentives in the organisational category. In the individual category, the factors include perceived usefulness, personal innovativeness, prior experience, image, and enjoyment with innovation. In the social category, the factors include peers and social networks. The factors in this model form a springboard for data collection variables. This model, again, forms a springboard for an e-Technologies and Practices Adoption Framework (e-TPAF). While this paper begins, therefore, by examining the factors that are influential in the adoption of e-HRM technologies and practices in the bank, it goes beyond to propose a general framework for the adoption of new e-technologies and practices during the critical times of disruption, uncertainty, complexity, and ambiguity.

Materials and Methods

Quantitative data was collected from the bank employees, who were targeted as the users of the e-HRM systems. The collected data was about establishing the levels of agreement with the factors of adoption of e-HRM technologies and practices in the bank on a 5-point Likert scale whereby "1" stood for strongly disagree and "5" for strongly agree. The list of the factors was developed from the Innovation Adoption Model [15]. See Table 1 for the factors used to collect data.

Table 1. 18 Factors Developed from the Innovation Adoption Model Developed [15]

Category	Factor
	The bank trains employees whenever there is a new technology
	Management has put regular training programs for the employees to cope with transitions in technology
	Bank management supports the use of new technologies
	Bank Management forces us to use the e-HRM technologies
	The bank management has allocated a considerable budget for implementation of e-HRM technologies
	The bank provides all needed hardware and equipment necessary for using e-HRM technologies
Organizational	Management gives incentives to employees who embrace technologies
	e-HRM technologies reduce my costs
	e-HRM technologies save my time
	e-HRM technologies reduce my errors
	I like to use IT-related technologies
	e-HRM technology is compatible with existing IT infrastructure
	The bank has speedy internet facility
	The bank has strong back-up plan for network failure
	e-HRM technologies easy to use
Individual	I have enough IT skills to use the e-HRM technologies
	Colleagues at the bank use the e-HRM technologies
Social	Colleagues at the bank help me when I have a problem with IT

Source: Compilation by researchers

In the three cities of Tanzania, the biggest, the second biggest, and the fastest-growing, the respondents were randomly selected from the branch categories of the mega, big, medium, and small branches. A questionnaire was designed in Google Forms and sent to the respondents by sharing a link via their WhatsApp accounts. Before the link was shared, a text was sent explaining the purpose of the study, assuring them of confidentiality of their responses and anonymity, and requesting their consent in order to participate in the study. Out of the 198-shared links, 162 were returned fully filled and submitted, yielding a response rate of 82%. The profile of the respondents, as presented in Table 2 shows that most of the respondents had their bachelor's degree (65%), came from big branches (48%), were adults of ages between 38 and 60 (46%), were bankers by position (69%), were experienced (83%), and were male (62%).

Table 2. Respondents' profile

Respondents		Frequency	Percent
Education	Secondary school	8	5
	Bachelor's degree	106	65
	Above Bachelor's degree	48	30
Branch size	Small	31	19
	Medium	54	33
	Big	77	48
Age	Young adults (18-37 years)	87	54
	Adults (38-60 years)	75	46

Position	Support staff	8	5
	Bankers	112	69
	Managers	42	29
Experience	Basic experience (0-5 years)	20	12
	Experienced (5-10 years)	134	83
	Very experienced (beyond 10 years)	8	5
Sex	Male	100	62
	Female	62	38

Source: Field data, 2019

The analysis of the data was done in two main steps. The first step was to establish which factors were "simply influential" and the second one to identify among the influential factors those factors that were "majorly influential". In order to identify the factors that "simply influenced" the adoption of the e-HRM technologies and practices, the categories of "agreement" and "disagreement" were created, and the mean scores were used to classify them. Both the "strongly agree" and "agree" were placed in the category of "agreement" (any mean score from 3.6 and above). The category of "disagreement" was created from the three groups of "completely disagree", "disagree", and "not sure" (any mean score below 3.6). A factor that fell in the category of "agreement" was interpreted as an influential factor and a factor that fell in the category of "disagreement" was interpreted as an uninfluential factor. The results are tabulated in Table 2 and 3.

In order to identify the factors that "majorly influenced" the adoption of the e-HRM technologies and practices, the Principal Component Analysis (PCA) is used. Only the factors that were perceived as influential are subjected to the PCA test. The identification of the major factors followed four steps. The first step checked the internal consistency of the factors. With the application of the "alpha varlist" command in Stata, the factors have been found to have an Alpha coefficient of 0.8840, which is far beyond satisfaction taken to be above 0.7 [33, 34]. The second step was to run the PCA test using the "pca varlist" Stata command. This command gives an output showing the Eigenvalues, the difference in the Eigen values, the proportions the component causes to the variance, and the cumulative proportions. Based on Kaiser's criterion, the study retains the three components with the Eigenvalues > 1 for further analysis. From the output of the PCA test (see Table 4), the third step is to identify the components with the Eigen values above 1. The fourth step was to link the components to the individual factors, using a Stata command "rotate, varimax blanks (.5)" (See Table 5 for output). Accordingly, with a level of confidence of 95%, a correlation with a coefficient of between 0 - 0.19 is considered very weak; between 0.2 - 0.39 is considered weak; between 0.4 - 0.59 is considered moderate; between 0.6 - 0.79 is considered strong, and 0.8 – 1.00 is considered very strong. The study uses the factor loadings greater than 0.5 as essential attributes for the Components.

Results

Uninfluential Factors

Of the identified factors, however, there were factors that did not seem to influence the adoption of e-HRM technologies and practices in the bank. Out of the 18 factors developed from the Innovation Adoption Model [15], seven factors (40%) were perceived as uninfluential by the respondents. These factors belong to the category of "disagreement" created from the three groups of "completely disagree", "disagree", and "not sure", with any mean score below 3.6. Table 3 presents these uninfluential factors.

Table 3. Uninfluential Factors for Adoption of e-HRM Technologies in the Bank

	Factor	Mean Score
C	Management gives incentives to employees who embrace technologies	3.1
D	Management has put regular training programs for the employees to cope with transitions in technology	3.5
F	The bank management has allocated a considerable budget for implementation of e-HRM technologies	3.5
H	The bank has speedy internet facility	3.4
I	The bank has strong back-up plan for network failure	3.1
L	e-HRM technologies reduce my costs	3.3
N	e-HRM technologies reduce my errors	2.8

Source: Field data, 2019

Simply Influential Factors

Table 4 presents the "simply influential" factors. Out of the 18 factors from the literature, 11 (60%) factors were perceived as influential by the respondents. These factors belong to the category of "agreement", which is composed of both the "strongly agree" and "agree" groups, with any mean score from 3.6 and above.

Table 4. Influential Factors for Adoption of e-HRM Technologies in the Bank

	Factor	Mean Score
A	Bank management supports the use of new technologies	3.8
B	The bank trains employees whenever there is a new technology	3.7
E	Bank Management forces us to use the e-HRM technologies	3.6
G	e-HRM technology is compatible with existing IT infrastructure	4.1
J	The bank provides all needed hardware and equipment necessary for using e-HRM technologies	3.9
K	e-HRM technologies easy to use	4.2
M	e-HRM technologies save my time	4.0
O	Colleagues at the bank use the e-HRM technologies	3.8
P	Colleagues at the bank help me when I have a problem with IT	4.1
Q	I like to use IT-related technologies	4.3
R	I have enough IT skills to use the e-HRM technologies	4.1

Source: Field data, 2019

Majorly Influential Factors

Table 5 shows the outputs of the PCA test on the "simply influential" factors for the adoption of the e-HRM technologies and practices in the bank.

Table 5. PCA Output of "Simply Influential" Factors

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp 1	5.44086	3.92556	0.4946	0.4946
Comp 2	1.5153	0.36225	0.1378	0.6324
Comp 3	1.15305	0.192815	0.1048	0.7372

Comp 4	0.960235	0.225067	0.0873	0.8245
Comp 5	0.735168	0.331675	0.0668	0.8913
Comp 6	0.403493	0.052357	0.0367	0.928
Comp 7	0.351136	0.068209	0.0319	0.9599
Comp 8	0.282927	0.197708	0.0257	0.9856
Comp 9	0.085219	0.044396	0.0077	0.9933
Comp 10	0.040823	0.0090341	0.0037	0.997
Comp 11	0.0317889	0.0317889	0.0029	1

Source: Stata output, "pca vlist"

As it can be seen in Table 5, the eleven Components represent the existing influential factors responsible for e-HRM technologies' adoption as perceived by the bank employees. Only three Components have Eigenvalues above 1, and 8 components are below 1. Based on Kaiser's criterion, the study retains the three components with the Eigenvalues > 1 for further analysis. Cumulatively, these three components account for a total variance of 74%. Component 1 accounts for 49% of the total variance; Component 2 accounts for 14%, and Component 3 accounts for 10% of the total variance.

After the Varimax rotation (see Table 6 for the Varimax rotated pattern matrix), the first Component is concerned with training: "The bank trains employees whenever there is a new technology". The second Component is about the easiness to use: "e-HRM technologies easy to use". The third Component is about force and adequacy. With regard to force, it is stated that "the Bank Management forces us to use the e-HRM technologies," and with regard to the adequacy, it is stated that "I have enough IT skills to use the e-HRM technologies".

Table 6: Varimax Rotated Pattern Matrix for Factors Influential to the Adoption of e-HRM Technologies

Variable	Comp1	Comp2	Comp3	Unexplained
A				0.2185
B	0.5046			0.2049
E			0.5238	0.3052
G				0.3157
J				0.1995
K		0.6227		0.147
M				0.2639
O				0.2196
P				0.3498
Q				0.2762
R			0.6924	0.3903

Source: Stata output 2019

Discussion

According to Baert et al. (2020), standard models in organizations are derived from the perspective of the "normal times." Such perspectives become challenging for predictions in the "abnormal times," as is with the case of the Covid-19 times that have generated uncertainty. It is for this matter that organizations need to be assisted in thinking outside the usual boxes that make reference to the normal times in order to adopt technologies and innovations that can promote performance and its management during the abnormal times and the new normals. Of the 18 (eighteen) factors developed from the Innovation Adoption

Model developed by Talukder (2012), 11 (eleven) are influential, and of these, only 4 (33%) seem to have an impact on the adoption of e-HRM technologies, then, more effort is needed to ensure that as many factors become majorly influential.

We, therefore, propose the New e-Technology and Practices Adoption Framework (Ne-TPAF), making use of the 4 categories of the organizational, individual, environmental, and social factors, together with the demographic category of factors, which according to Quazi and Talukder (2021, p.54) affect the individual's adoption of technological innovation. The model hypothesizes the interaction between the organizational, individual, environmental, social, and demographic factors to promote a conducive pre-condition (technology and practice adoptive perceptions and attitudes) for the adoption of e-technologies and practices. The e-Technologies and Practices Adoption Framework is presented in Figure 1. The Framework begins with the "in-house analysis" that deals with the stocktaking of what organizational, individual, environmental, social, and demographic factors are likely to influence the adoption of new e-technologies and practices during critical times. There follows a "situational analysis" that assesses the "level of influence" (whether minor or moderate or major). After the situational analysis, there follows a "Strategic mapping," whereby there is meticulous planning and implementation of strategies in order to "include uninfluential" factors, "enhance simply influential" factors, and "sustain majorly influential" factors for the adoption of new e-technologies and practices. The inclusion, enhancement, and sustenance of factors will lead to the promotion of perceptions and attitudes that should lead to the adoption of new e-technologies and practices during critical times.

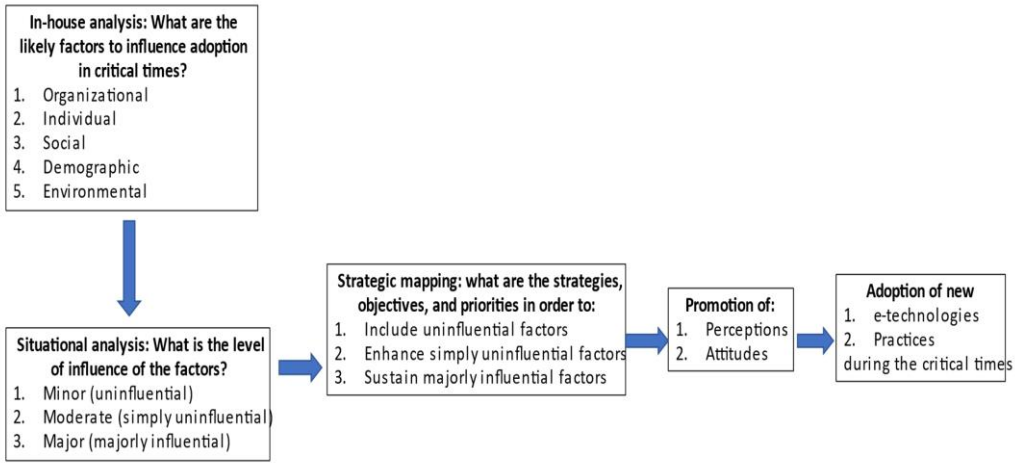

Figure 1. The New e-Technology and Practices Adoption Framework (Ne-TPAF)

Conclusion

The study investigated the factors influencing the adoption of e-HRM technologies in order to promote the adoption of new e-technologies and practices during the critical times of disruption, uncertainty, complexity, and ambiguity, as is with the case of the Covid-19 pandemic. In the

adoption of e-technologies, there are factors that are uninfluential, simply influential, and majorly influential. However, as all factors are essential, all need to be promoted and integrated in order to adopt the e-technologies during critical times. And this is the essence of the New e-Technologies and Practices Adoption Framework (Ne-TPAF).

Declaration of Conflict of Interest

We, the authors, Judith Namabira, Berine Rhobi Magaria, and Tafuteni Nicholaus Chusi, hereby declare that the disclosed information is correct and that no other situation of real, potential or apparent conflict of interest is known to us. We undertake to inform you of any change in these circumstances if any issue arises.

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An Investigation into Project Management Best Practices in Nigeria's Telecommunication Industry

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Abstract

The purpose of the study was to investigate project management best practices in Nigeria's telecommunication industry. Data was collected across 379 telecommunication firms and analyzed using the descriptive method. The study found that telecommunication firms in Nigeria adopt the best project management practices. Best project management practices are widespread in the telecommunication industry in Nigeria. The project management practices adopted by telecommunication firms include holding initial meetings of all the project stakeholders, the development of project scope management, keeping all related parties updated throughout the project's lifecycle, the creating of resource plan, the creation of a response risk team, transparency in the implementation of projects, setting realistic project milestone and review of project performance.

Keywords*: Best Practices, Project, Project Management, Telecommunication Industry.*

Introduction

Nowadays, organizations are increasingly using projects to achieve organizational goals. [1] posit that currently, more and more organizations are recognizing that translating strategies into actions requires project management. [2] argues that organizations are using project management practices as a tool to achieve competitive advantage. In this contemporary world, the need to adopt best project management practices has become a matter of necessity for organizations [3]. The application of information, skills, tools, and strategies to project activities is known as project management. Project management is widely acknowledged as a critical facilitator of company transformation and crucial to long-term business success [4]. Project management has evolved over time to a sophisticated and complex process, becoming the principal means of dealing with change in modern organizations. Although it is difficult to refute the notion that project management practices have improved fairly over the last three decades, there are still issues with the underlying assumptions and practices of project management [5]. [6] report that project management is hampered by poor project cost control, poor information flow, and lack of knowledge transfer. Again many of the studies on project management practices have focused on the construction industry in Nigeria [7], [8], [9] and have ignored the telecommunication sector. The successful completion of telecommunication projects in Nigeria depends to a large extent on effective project management practice. The aim of the study is to evaluate the extent of formal project management practices implemented by telecommunication firms in Nigeria.

Literature Review

Project

A project is an activity where we expend capital resources to create an asset, which we expect, benefits over an expected period of time

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[10]. According to [11], a project is a temporary endeavour undertaken to create a unique product or service" A project is a temporary endeavour (that has a definite beginning and end time) [12]. A project is defined as a short-term activity undertaken to produce a one-of-a-kind product, service, or outcome. A project is described as short term because there is a distinct and clear beginning and end; project management involves customized actions to support this quality; as a result, how well a project performs against its schedule that is, does it start and conclude on time is a significant measure of project success. Because of the distinctiveness of the deliverable, a unique method is required because there may not be a pre-existing document for the project's implementation, and there may not be a requirement to replicate the project after it is done. Distinctiveness does not imply that there are no parallels with other projects; rather, a project's scope includes deliverables that must be created within certain limitations and with specified resources. This makes the project deliverables unique from other projects.

Project Management

[13] asserted that project management is about planning, organizing, controlling and directing the company's resources effectively to complete the project on time. [14] argued that project management is the process to achieve the project objectives through certain skills, tools and controls. Project management is the utilization and incorporation of current management and project management knowledge, aptitude, and techniques to the entire organization, controlling, collaboration, supervision of all aspects of a project from start to finish and the motivation of all those involved to produce the product, service or result of the project on time, within authorized cost, and to the required quality and requirement, and to the satisfaction of stakeholders [15].

Best Practices, Guidelines or International Standards in Project Management

A best practice is a technique, method, or process that is believed to be more efficient and effective in achieving a goal than any other techniques, methods and processes. The best practice is a term that describes the process of creating and adhering to a standard manner of doing things. It is based on experience.

Best practice in project management is a broad concept that encompasses:

1. Guiding principle
2. Global principles

Standards issued by specialized organizations are usually based on best practices and guidelines given by professional bodies.

Benefits of Adopting Project Management Best Practices

Project management was originally acknowledged as a distinct management approach in the 1950s, distinct from other management systems used in government or private enterprise [16]. Project management has now reached a worldwide level, with project management approaches maturing into guidelines and international standards that are widely acknowledged and used.

The following are some of the benefits of employing international standards and guidelines in project management:

1. Knowledge transfer: The most common reason for project objectives and goals not being met is poor project management [16]. A standardized approach to project management assists the project manager in managing multiple projects with varying competency requirements, reducing management risk and maximizing goal achievement.
2. Improved communication: Communication is a critical component of project management, and it is a major factor that influences a project's success or failure.

Standards are also expected to help harmonize divergent terminology and different understandings of processes and methods [17].

3. Time and cost savings: Because projects are time-sensitive, time management is an important aspect of project management. Only when you look at how much time is wasted recreating the wheel do you realize how valuable it is [18].

Best project management methods have the benefit of saving time and money when dealing with projects, which is something that all project-based firms should strive for, especially in this time of economic distress.

Methodology

The study adopted a survey as the research design. The survey method was considered the most appropriate design for conducting this study since it describes issues in their current state [19]. According to the National Communication Commission of Nigeria, as at the end of 2020, there were 7916 telecommunication companies that have been licensed, and thus this figure formed the population of the study. The sample size for the study was determined using the Yamane sample determination formula. Using an actual population of 7196, a sample size of 379 telecommunication firms has arrived. In selecting the participant organization for the study, a stratified and simple random sampling method was used. Stratified sampling was first used to categorize telecommunication firms. According to the National Communication Commission, telecommunication firms have been classified under 24 license classifications; hence these classifications formed the organizational strata. A sampling fraction of 4.16% was selected from each category (strata) of telecommunication organizations. Participant organization's in each classification was selected randomly. In selecting the participant's organizations, simple random sampling was used. A simple random sampling method was used so as to ensure that all the telecommunication organizations get an equal chance of being selected as part of the sample. The distribution of the strata is presented in Table 1.

Table 1. Distribution of the Organizational Strata

Category (strata)	**Total number organizations selected**
Sale and Installation	301
Repairs and maintenance of facilities	10
Cabling services	5
Telecenter	34
Public payphone services	1
Internet services	6
Non-commercial closed up group	1
Unified Access services	1
International data services	1
International gateway	1
Interconnect exchange	1
Metropolitan fiber cable	1
Mobile number portability	1
National carrier	1
National long-distance communication	1
Public mobile communication	1
International submarine cable infrastructure	1

Value added services	5
Infrastructure sharing and collation services	1
Automated vehicular tracking services	1
Open access fibre	1
Infrastructure network	1
Wholesale wireless access services	1
Private network links	1
Total	**379**

The research instrument used to collect data for this study was a questionnaire. Out of the 379 firms administered with a questionnaire, 315 firms, however returned the questionnaire representing a response rate of 83.11%. The technique used to analyze the data collected was the descriptive method. Specifically, the means of the response provided by the participating organizations was calculated and interpreted.

Results

Project Management Best Practices in the Telecommunication Industry of Nigeria

Table 2 presents the data on the project management best practices of telecommunication firms in Nigeria.

Table 2. Project Management Best Practices of Telecommunication Firms in Nigeria

	N	Mean	SD
Before a project is started, an initial meeting of all the project stakeholders are invited and their relevance to the primary objectives of the project is discussed	315	4.1079	.53038
My firm develop project scope management and get it approved by all relevant parties	315	4.1238	.83355
Project managers keep all related parties updated throughout the project's lifecycle.	315	3.8762	.85244
My firm creates a resource plan for projects	315	4.2317	.85601
My firm creates a response risk team for projects	315	4.3079	.46237
My firm ensures transparency in project implementation	315	3.8603	1.16457
My firm puts in place change management plan in place for projects	315	2.1079	1.16795
My firm maintain a detailed project log where every decision is explained	315	1.6159	.94181
My firm set realistic project milestone and agree on deadlines or features that are possible to achieve	315	4.2762	.64584
My firm review and reflect on the performance of projects so as to improve the implementation of future projects	315	4.2000	.99745

From Table 2, the participant organizations agreed (a mean score of 4.1079) that before a project is started, an initial meeting of all the project stakeholders is invited and their relevance to the project's primary objectives is discussed. This is to discuss the goal of the project and the process that will be followed to execute the project.

Another project management best practice used by telecommunication firms in Nigeria is that the firms develop project scope management and get it approved by all relevant parties. This was reported via a means score of

4.12. The scope of the project is determined at the start of the project so that there is a clear definition of what the project entails. This also ensures that the project does not deviate from its initial scope or boundaries.

Also, the study found that (through a mean score of 3.87) project managers keep all related parties updated throughout the project's lifecycle. The related parties for example, management, employees, customers, National Communication Commission of Nigeria etc on the progress of projects.

Again the participants reported that (through a mean score of 4.23) their firm creates a resource plan for projects. Telecommunication projects are very expensive so before a project is initiated, the firms put in place a funding mechanism so that the project does not stall along the way. This also ensures that there are no project delays.

Further, the firms create a response risk team for projects. This was reported via a mean score of 4.30. The firms have instituted a risk team that deals with unintended outcomes or issues affecting the firm. For example, when there is an accident or safety issue in the implementation of a project, the risk team responds to control the situation.

In addition, the telecommunication firms show transparency (mean score of 3.86) in the implementation of projects. The telecommunication firms ensure that information flow runs through the execution of projects. Information flow is two ways, from implementers of the project to management and vice versa.

Other project management practices adopted by telecommunication firms are: setting realistic project milestones (mean score of 4.27) and reviewing and reflect on the performance of projects (4.20). The firms set deadlines that are realistic and possible to achieve. This ensures that project targets are achieved within the stated timeframe. In reviewing the performance of projects, the telecommunication firms are able to enhance the execution of the current project in addition to future projects.

Although the data shows the widespread use of recognized best project management practices, there were two project management practices that the telecommunication firms have not embraced: 1) lack of change management plan (and 2) absence of a detailed project log where every decision is explained. The mean score of 2.10 implies that the participants disagreed that their firm has put in place a change management plan in place for projects. Also, the mean score of 1.61 indicates that the participants disagreed that their firm maintains a detailed project log where every decision is explained. This implies that telecommunication firms do not keep accurate records on activities taken in the implementation of projects.

Discussion

Telecommunication firms in Nigeria to a large extent, adopt effective project management practices. This is, however contrary to the findings of [6], who conducted a similar study but in a different industry i.e construction industry. [6] found that project management practices fall short of the required standards in the construction industry in Nigeria. This however is not the situation in the telecommunication industry in Nigeria. Telecommunication firms are deploying best project management practices for stronger results and happier employees. Effective project management procedures help telecommunications companies to concentrate on task that are important rather of being distracted by activities that go off course or budgets that go cost overruns. It helps workers to recognize how their job contributes to the company's goals and empowers them to create outcomes that truly enhance the firm's productivity.

With the right planning, the telecommunication firms ensure that the work is delivered on time and within budget. Using best project management practices, the firms

map their project's from the start, they'll know where the deadlines - and estimated expense - will fall, allowing them to more efficiently organize their resources and minimize delay and cost. This result is in agreement with the findings of [1] who found that efficient project management processes help firms reduce the intricacies of collaboration, increase transparency, and ensure accountability. With a clearer picture of how the project is progressing, telecommunication firms get a deeper understanding of where resources are being spent, where they need to prioritize and when, and if they are at risk of going off track. Good project management means that the telecommunication firms are able to predict problems before they arise, bottlenecks can be avoided, and wiser, data-driven choices can be made.

Conclusion

The study provides evidence that telecommunication firms in Nigeria adopt the best project management practices. Best project management practices are widespread in the telecommunication industry in Nigeria. The project management practices adopted by telecommunication firms include: i) before a project is started, an initial meeting of all the project stakeholders are invited and their relevance to the primary objectives of the project is discussed ii) firms develop project scope management and get it approved by all relevant parties iii) project managers keep all related parties updated throughout the project's lifecycle iv) the firm creates a resource plan for projects v) the firms create a response risk team for projects vi) the firms show transparency in the implementation of projects vii) setting realistic project milestone and viii) review and reflect on the performance of projects. However, the study found two areas that the telecommunication firms fall short: a lack of change management plan and the absence of a detailed project log where every decision is explained. The telecommunication firms must make it a point to put in place a change management plan for project implementation. The implementation of the project comes with changes in task, attitude, work culture etc. Hence it is important that the telecommunication firms design a change management plan so that the firm can assist the workers in adapting to the demands of the project.

Also, the telecommunication firms must maintain a detailed project log where every decision is explained. The decisions of the project must be recorded in the log book so that references can be made to it for future projects. It could become a useful document for improvement in project implementation.

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Conflict of Interest

The author did not receive any financial support or funding for the research. The study was financed wholly by the author; thus, I do not pose a conflict to the research objective.

The author works in the telecommunication sector of Nigeria, which facilitated getting data from industry players. However, my association with the telecommunication sector of Nigeria did not in any way influence the objectivity of the study. I conducted the study to the best of my professional abilities.

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Perception Regarding Health Care Financing System and Its Advancement towards Universal Health Coverage in Nigeria among Residents of Awka, Anambra State

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Abstract

The purpose of this study was to explore the perception regarding the health care financing system and its advancement towards health coverage in Nigeria among residents of Awka, Anambra state. An exploratory survey approach was used; and entailed the collection of both qualitative and quantitative data from 360 participants using one set of structured questionnaires, which was also used as an interview guide to collect data from the non-literate respondents. The findings reveal that majority of the respondents do not have knowledge of what the health care financing system involves, whether, on generation, allocation, or utilization of funds for health care, and thus do not agree with whatever the objectives of health care financing system is in Nigeria. Out-of-pocket expenditure has been reported as the mechanism commonly used for implementing a health financing system in Nigeria. There is little or no knowledge regarding the objective of pooling resources for health and no knowledge of how the government secures health services for the populace. Nigeria should develop and implement health financing policies that ensure contributions from relevant stakeholders aimed at investing in individuals, families, and communities, ensuring capacity development that will enable their active and meaningful engagement in health issues. This will thus optimize their knowledge as advocates for healthy policies, active co-developers of health and social services, and implementers of these services.

Keywords*: Health care financing, Health financing system, Pooling of funds, Universal health coverage.*

Introduction

Universal Health Coverage (UHC) is a target under Goal 3 of the United Nations' 2030 Sustainable Development Goals (SDGs). This Goal 3 of the SDGs thrives to "Ensure healthy lives and promote wellbeing for all at all ages," with Target 3.8 aiming at achieving UHC, including financial risk protection, accessible and quality essential health care services, with access to safe, effective, quality, affordable and essential vaccines, and medicines for all. The vision of UHC as an object of health policy has grown widely in acceptance at country and global levels. This has led to a sharp and sudden rise in the demand for expertise, evidence and measures of advancement and a push to make UHC become one of the goals targeted as the post-2015 development agenda [1]. Considerations of politics and the multiplicity of stakeholders shape the decision of a country's leadership to commit to UHC [2, 3]. The aim of monitoring of UHC by countries is to ensure that progress toward UHC reflects the country's unique demographic and epidemiological profile, the population's demands and expectations, the status of the health system and the level of economic development [4]. These country-specific dimensions are critical for deciding what should

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be monitored; for example, emerging economies might focus on how best to increase the scope of essential services to remote areas, whereas high-income countries might focus on modifying the range of available health services to allow for a growing elderly population, while the country context determines the measures used, the domains to be monitored (coverage with good-quality essential services and with financial protection) are relevant to all countries, regardless of the level of income, demographic profile or health needs [4].

Data suggest that of the 2019 global population of 7.674 billion people, many suffer financial catastrophe every year due to out-of-pocket (OOP) health expenditures [5]. About 925 million people expend more than 10% of their household income on health care, and over 200 million expend more than 25% (so-called 'catastrophic' expenditures) [6]. The incidence of catastrophic expenditures has increased over the last 15 years, as a consequence of inadequate coverage of the health sector in the annual budgets of Nations, with further reduced emphasis on provisions and strategies for the financial protection of people with health needs in the health budget, especially at the primary, promotive and preventive levels [6]. Nigeria has been shown to have among the highest out-of-pocket health spending and poorest health indicators in the world [7].

Since the acceptance of the concept of UHC by the World Health Assembly in the year 2005, followed by its implementation as one of the 2030 Sustainable Development Goal (SDG) Agenda, the successes recorded so far vary in different countries and continents, and the case of Nigeria remains very pathetic. It should be borne in mind that the policy context of each country is unique, as such, while some policy options have worked successfully in some countries and settings, it is noteworthy that lessons from elsewhere should be applied cautiously. Nigeria's main strategic approach for achieving UHC is the National Health Insurance Scheme (NHIS) [8], which is a contributory social health insurance scheme. Ever since the formal launch of the NHIS on June 6, 2005, not more than 4 percent of Nigeria's population has been covered by the scheme [8]. The importance of effective leadership where stakeholders are engaged in decisions on the best fit approach for achieving universal health coverage to ensure adequate public spending cannot be over-emphasized.

This study is an exploratory survey with the following specific objectives:

1. To ascertain the perception of the stakeholders regarding the objectives of implementing the health financing system.
2. To determine their perception regarding mechanisms commonly used for implementing health financing systems in Nigeria.
3. To ascertain the perception of the stakeholders regarding pooling of funds for health.
4. To determine the perception of the stakeholders regarding purchasing of health services.
5. To ascertain the perception of the stakeholders the benefits of implementing health care financing.

Studies of perception act as reviews of the position of things and thus are valuable in the development and/or revision of evidence-based policies and strategies. Thus, the findings from this study of the perception of the people will contribute to available lessons that will inform and support overall health sector planning, especially the health financing policies and planning. As Nigeria commits to strive towards the attainment of universal health coverage, the findings from the study can help policy makers to consider engaging the stakeholders in prioritizing challenging demands, and making coherent and appropriate choices, adapting their approaches to local conditions. The knowledge of the perception of the people and possibly engaging them at all levels of decision making will in turn facilitate making better policy decisions by the governments. The findings

from the study will contribute to the development of the advocacy packages for relevant stakeholder groups, which might be needed to reinforce efforts toward the attainment of UHC. The study involved the general public and not just civil servants since it was intended to explore the current status.

Literature has it that a health financing system comprises the means by which funds are generated, allocated, and used for health care provision. Health financing comprises of three interconnected functions: mobilization and collection of funds, pooling of prepaid funds, and allocation of resources, including purchasing and paying for services [9]. The commonly used mechanisms to ensure the implementation of these functions of health financing are tax-based financing, out-of-pocket payments, donor funding, and health insurance (Whether social, community-based, or private). These methods are not mutually exclusive, explaining that most health systems adopt a mixture of various methods [10]. The success of the various health financing methods can be assessed by the overall effects on equity of access and health outcomes; revenue generation and efficiency, and the effects on the user and provider behavior [10].

Equity in the utilization of health services and resources should be distributed according to need, not according to other factors such as people's ability to pay for services [11]. Whereas the financing objectives have to do predominantly with how money is generated to pay for the health care and system, the utilization objective has to do (in terms of the contribution of health financing policy) more with how money is expended by the health system [11]. Improvement in transparency and accountability of the health system to the population is that the entitlements and obligations of the population should be well understood by all, reflecting the promise by the specific authority to the people. The key message is that in addition to the periodic reporting by the relevant authorities to the people on the extent to which progress is being made, there should be active and meaningful involvement of all relevant stakeholder representatives. Dimensions of accountability range from (relatively simple) tracking and reporting on financial resources (e.g., audit), to (more complex) reporting on performance relative to some agreed measures, to (most complex) enhancing the legitimacy of the government in the eyes of the people [11].

The framework in Figure 1 on health system functions, health financing policies and objectives is used to assess the extent to which a nation strives towards the attainment of the health systems goals as captured within the UHC. Similarly, the framework can be used to examine the level of government responsiveness through contributions of the health policies and objectives towards attaining the health systems goals.

The framework postulates that a responsive government anticipates and adjusts to existing and future health needs of the people, thus contributing to better health systems and health outcomes. The government's responsiveness to health is measured by the actual experience of people's interaction with their health system through their perception, which confirms or disconfirms their initial expectations of the system. An important element of health systems responsiveness relates to people's reflections on their experiences of using services, which remain a widely recognized proxy for measuring systems responsiveness, and are shaped by the characteristics of both health services (e.g., availability, accessibility, and quality) and people (e.g., their expectations and relationships within the communities) [12]. The degree of provider accountability to other actors shapes their discretion to address people's expectations or their receptivity to people's concerns, thus highlighting the importance of going beyond the health service-focused interpretation of responsiveness and underlines the significance of interactions among

providers, managers, and policy makers in shaping the system's responsiveness [12].

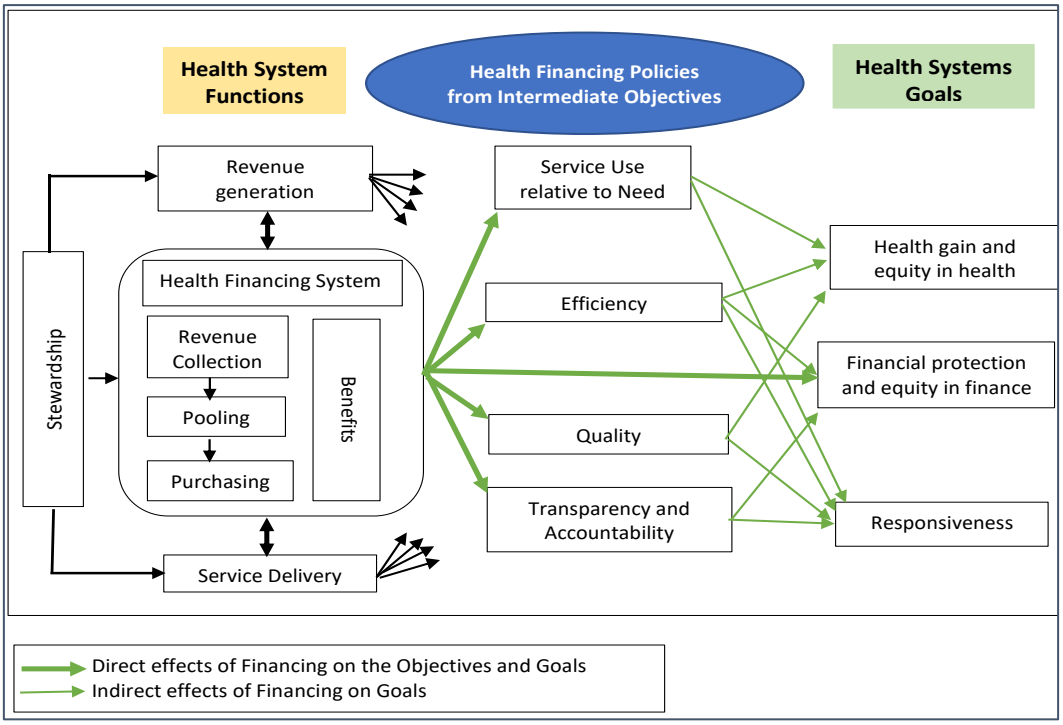

Figure. 1. Health System Structure, Health Policy Objectives and Health System Goals

On perception regarding health care financing towards the attainment of UHC, Nigeria has shown commitment to achieving universal health coverage (UHC), but progress has been slow. The 2014 Presidential Summit Declaration affirmed that UHC is key to ensuring equitable access to high-quality, affordable health care for all Nigerians [13]. Although the summit was built on a highly participatory stakeholder engagement process, its concomitant momentum has waned [13]. In Nigeria, several attempts to evaluate health financing mechanisms point to the fact that there has not been anyone mechanism that suits all situations.

Health is financed by public and private funds [14]. A major reliance on public, compulsory, prepaid funds is necessary to make progress toward universal health coverage (UHC). No country could have made significant progress towards attaining universal health coverage (UHC) without depending on a main share of public funds to finance health [15]. The way budgets are formed, allocated and used in the health sector is at the core of the UHC agenda [14]. A necessary condition to enable the effective implementation of health financing reforms toward the attainment of universal health coverage is robust public participation in budgeting in the health sector. Proactive engagement of health ministries in the budgeting process can facilitate alignment of budget allocations with sector priorities, as laid out in national health strategies and plans; and in so doing, allocative efficiency within the sector's resource envelope can be improved [16].

Methods and Materials

An exploratory survey approach was used, and entailed the collection of both qualitative and quantitative data using one set of questionnaires. This structured questionnaire was used to gather information from the literate community members who could read and write and as an interview, guide to collect data from the non-literate groups.

360 persons between the ages of 15 and 64 years from the general public were involved. Other inclusion criteria were that the persons

must be resident in Awka for at least 15 years, be willing to participate in the survey, and must be willing or able to understand and sign informed consent. A three-stage multi-stage sampling technique was employed to select study villages, study households and individual participants. With this technique, adequate representation of the population of every resident of the metropolis was assured.

Direct questionnaire administration was adopted. Perception of the respondents was measured with different questions which had both open-ended and close-ended statements. The closed-ended questions sought for their perception along the line of how deeply they feel about the various statements. The open-ended questions provided suggestions on how to improve the situation. The necessary approvals were sought and obtained. Data collected were analyzed using frequency distribution tables and percentages. The entire study lasted for twelve weeks, from September to November 2021.

Results

Three hundred and sixty questionnaires were distributed, with a complete return rate (100%). Of the 360 participants that responded to the questionnaire, 190 (52.8%) were males, and 170 (47.2%) were females. The socio-demographic characteristics of the respondents are shown in Table 1 below.

Table 1. Socio-demographic Characteristic of Respondents n = 360

	Male	**Female**	**Total**
	n =190 (52.8%)	n = 170 (47.2%)	n = 360
Age of Respondents			
15 – 24 yrs	15 (65.2%)	8 (34.8%)	23 (6.4%)
25 - 34 yrs	65 (55.6%)	52 (44.4%)	117 (32.5%)
35 – 44 yrs	69 (52.3%)	63 (47.7%)	132 (36.7%)
45 – 54 yrs	38 (48.7%)	40 (51.3%)	78 (21.6%)
55 – 64 yrs	3 (30%)	7 (70%)	10 (2.8%)
Educational Attainment			
Primary education	4 (33.3%)	8 (66.7%)	12 (3.3%)
Secondary education	96 (50.5%)	94 (49.5%)	190 (52.8%)
Tertiary education	90 (57.0%)	68 (43.0%)	158 (43.9%)
Marital Status			
Never married	59 (60.2%)	39 (39.8%)	98 (27.2%)
Married	113 (55.9%)	89 (44.1%)	202 (56.1%)
Widowed	11 (31.4%)	24 (68.6%)	35 (9.7%)
Separated	5 (33.3%)	10 (66.7%)	15 (4.2%)
Divorced	2 (20%)	8 (80%)	10 (2.8%)
Occupation			
Student	16 (57.1%)	12 (42.9%)	28 (7.8%)
Employee	105 (50.5%)	103 (49.5%)	208 (57.8%)
Business	48 (63.2%)	28 (36.8%)	76 (21.1%)
Retired	20 (46.5%)	23 (53.5%)	43 (11.9%)
Farmer	1 (20%)	4 (80%)	5 (1.4%)

Table 1 shows that male respondents were slightly more in number 190 (52.8%) than female respondents (170 (47%). The majority, 132 (36.7%) of the respondents are in the age range of 35 – 44 years, closely followed by the age range of 25 -34 years (117 [32.5%]), ages

45 – 54 were 78 (21.6%) respondents. On educational attainment, majority 190 (52.8%) of the respondents had secondary school education, with 158 (43.9%) respondents attaining tertiary education. Few 12 (3.3%) participants had primary education. Most 202 (56.1%) respondents are married, with 98 (27.2%) never married and 35 (9.7%) widowed respondents. Respondents who are either separated or divorced were 15 (4.2%) and 10 (2.8%), respectively.

Occupation status showed that the majority, 208 (57.8%) of the respondents are employees, while 76 (21.1%) are in business and 43 (11.9%) retired. Students and farmers were 28 (7.8%) and 5 (1.4%), respectively.

Perception on What the Health Care Financing System Involves

Perception regarding the health financing system was measured with their opinions on what health care financing system involves, the objectives of implementing the health financing system, the mechanisms commonly used for implementing the health financing systems in Nigeria. Other dimensions measured were their perception concerning the objective of pooling resources for health and purchasing health services; and the benefits of implementing these health financing systems.

Table 2. The Health Care Financing System involves the Means in which Funds (Mostly Money) are n = 360

Description	**Responses**				
	Strongly Disagree	**Disagree**	**Undecided**	**Agree**	**Strongly agree**
Generated for health care	37	89	155	60	19
	(10.3%)	(24.7%)	(43.0%)	(16.7%)	(5.3%)
Allocated for health care	32	67	148	80	33
	(8.9%)	(18.6%)	(41.1%)	(22.2%)	(9.2%)
Utilized for health care	18	53	163	115	11
	(5.0%)	(14.7%)	(45.3%)	(31.9%)	(3.1%)

On what health care financing system involves, Table 2 above reveals that a great majority, 155(43.0%) out of 360 respondents indicated no opinion towards the issue of health care financing system generating funds for healthcare, 89 (24.7%) and 37 (10.3%) disagreed and strongly disagreed respectively. However, 60 (16.7%) and 19 (5.3%) respondents agreed and strongly agreed, respectively that the system is for generation of health care funds. Similarly, on health care financing system involving the means in which funds are allocated for health care, the majority 148 (41.1%) respondents indicated no opinion on the issue, closely followed by the respondents that agree with the issue 113 (31.4%); and those the disagreed 99 (27.5%). On health care financing system involving the means in which funds are utilized for health care, 163 (45.3%) out of 360 respondents still maintained they had no opinion on the issue, followed by 125 (35.0%) respondents who agreed; then 71 (19.7%) respondents disagreed.

The implication of the above findings is that majority of the respondents do not have knowledge of what the health care financing system involves, whether on generation, allocation or utilization of funds for health care.

Perception on the Objectives of Implementing the Health Financing System

Responses to what the objectives of implementing the health financing system includes revealed that the majority of the respondents are in disagreement with all issues raised in the questionnaire, as in Table 3 below:

Table 3. The Objectives of Implementing the Health Financing System Include to n = 360

Study Statement	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Raise enough funds to provide a basic package of essential services to individuals in order to protect them from catastrophic medical expenses.	10 (2.8%)	37 (10.3%)	53 (14.7%)	212 (58.9%)	48 (13.3%)
Manage these funds to pool health risks equitably and efficiently, while ensuring sustainability	10 (2.8%)	37 (10.3%)	58 (16.1)	212 (58.9%)	43 (11.9%)
Ensure the payment for health services (Purchase of health services) in ways that are allocatively and technically efficient.	5 (1.4%)	23 (6.4%)	58 (16.1)	256 (71.1%)	18 (5.0%)

On raising enough funds to provide a basic package of essential services to individuals in order to protect citizens from catastrophic medical expenses, 260 (72.2%) respondents disagreed, 53 (14.7%) remained undecided, and 47 (13.1%) agreed as shown in Table 3 above. Perception on managing these funds to pool health risks equitably and efficiently while ensuring sustainability showed a similar trend. The majority 255 (70.8%) of the respondents disagreed, followed by 58 (16.1%) who said that they do have an opinion, then 47 (13.1%) that agreed with the issue. In the same vein, a greater proportion of the respondents (274 [76.1%]) disagreed with the issue of the objective of health care financing being to **e**nsure the payment for health services (Purchase of health services) in ways that are allocative and technically efficient. 58 (16.1%) respondents no opinion on the issue, while 28 (7.8%) agreed.

The implication here is that people are not in agreement with whatever the objectives of the health care financing system is in Nigeria.

Perception on the Mechanisms Commonly used for Implementing the Health Financing Systems in Nigeria

Table 4. In Nigeria, the Mechanisms Commonly used for Implementing the Health Financing Systems Include n = 360

Study Statement	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Tax-based financing	0	4 (1.1%)	217 (60.3%)	109 (30.3%)	30 (8.3%)
Out-of-pocket payments	297 (82.5%)	53 (14.7%)	10 (2.8%)	0	0
Donor funding and support	0	4 (1.1%)	217 (60.3%)	109 (30.3%)	30 (8.3%)
Health insurance (social and private)	0	4 (1.1%)	217 (60.3%)	109 (30.3%)	30 (8.3%)
A combination of them	0	4 (1.1%)	217 (60.3%)	109 (30.3%)	30 (8.3%)

On tax-based financing being the mechanism commonly used for implementing health financing systems in Nigeria, Table 4 above reveals that 217 (60.3%) of the respondents are undecided, with 139 (38.6%) disagreeing while only 4 respondents agreed. In contrast, out of pocket payment as a mechanism got the majority of 350 (97.2%) out of 360 respondents in agreement, with 10 (2.8%) being undecided. No respondent disagreed. Donor funding got most respondents, health insurance (Social and private), and a combination of them, had a similar response from the respondents, with a majority 217 (60.3%) of the respondents agreeing, 139 (38.6%) disagreeing while only 4 (1.1%) respondents agreed.

The findings in Table 4 above imply that respondents perceive out-of-pocket expenditure as the mechanism commonly used for implementing a health financing system in Nigeria.

Perception Concerning the Objective of Pooling Resources for Health

Table 5. The Objective of Pooling Resources for Health is to n = 360

Study Statement	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Make expenses on health more predictable	0	4 (1.1%)	217 (60.3%)	109 (30.3%)	30 (8.3%)
Protect households from paying the full cost of healthcare at the point of service delivery.	0	4 (1.1%)	217 (60.3%)	109 (30.3%)	30 (8.3%)
Ensure that people get the health services they need as the need arises	0	4 (1.1%)	217 (60.3%)	109 (30.3%)	30 (8.3%)
Promote equity, as those with greater ability to pay and those with less risk of getting sick subsidize poorer and higher risk individuals	0	4 (1.1%)	217 (60.3%)	109 (30.3%)	30 (8.3%)

The findings in Table 5 above on perception concerning what the objective of pooling resources for health reveal that the opinions of the respondents remained the same on all dimensions measured. Majority 217 (60.3%) of the respondents, indicated undecided, followed by those (139 [38.6%]) that disagreed with all statements. Only 4 respondents showed agreement on all statements.

This implies that the respondents do not perceive the objective of pooling resources for health as making expenses on health more predictable or protecting households from paying, nor do they perceive it as ensuring that people get the health services they need or promoting equity in health care provision.

Perception Concerning the Objective of Purchasing Health Services

On the objective of purchasing health services, the responses show the same pattern for all statements as in Table 6 below.

Table 6. The Objective of Purchasing Health Services (Payment for Health Service Rendered) Include n = 360

Study Statement	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Efficiency in service provision (Technically and in allocation of health services	0	2 (0.6%)	210 (58.3%)	111 (30.8%)	37 (10.3%)
Appropriate purchasing (payment) arrangements assures quality of services and thus provide better value for money	0	2 (0.6%)	210 (58.3%)	111 (30.8%)	37 (10.3%)
Means of ensuring sustainability of services by obtaining additional "funding" for the health system	0	2 (0.6%)	210 (58.3%)	111 (30.8%)	37 (10.3%)
Promotes consumer satisfaction	0	2 (0.6%)	210 (58.3%)	111 (30.8%)	37 (10.3%)

On all dimensions measured, the majority 210 (58.3%) of the respondents were undecided, followed by those 148 (41.1%) respondents that disagreed with 2 (0.6%) respondents agreeing. The findings could be interpreted to mean that either there is no knowledge of how the government secures health services for the populace or there is total lack of interest in what the government does and how it is done.

Perception Concerning the Benefits of Implementing these Health Financing Systems

On the benefits of implementing these health financing systems, the same pattern of response as in their perception towards the objective of purchasing health services in Table 6 was found. The majority 210 (58.3%) of the respondents, were undecided, followed by 148 (41.1%) respondents that disagreed with 2 (0.6%) respondents agreeing.

It can be deduced that knowledge of the benefits may not be adequate considering the fact that most of the respondents were not knowledgeable about the mechanisms commonly used for implementing health care financing in Nigeria, nor the objectives of pooling resources for health and objective of purchasing of health services.

On what could be done to pursue the course of efficient health care financing in Nigeria regarding the pooling of funds, purchasing of health services and health service delivery, the clear and cross cutting suggestions that came across were:

1. Public awareness creation concerning the happening around health care financing at all levels especially, the communities, and with various media of communication.
2. Involvement and meaningful engagement of stakeholders in health care financing issues so as to keep them informed and committed.

Discussion

Perception on What the Health Care Financing System Involves

Majority of the respondents do not have knowledge of the what health care financing system involves, whether on generation, allocation or utilization of funds for health care. This finding goes to buttress the people's expectation from government. Government's responsiveness to health is measured by the actual experience of people's interaction with their health system through their perception,

which confirms or disconfirms their initial expectations of the system.

An important element of health systems responsiveness relates to people's reflections on their experiences of using services, which remain a widely recognized proxy for measuring systems responsiveness, and are shaped by the characteristics of both health services (e.g., availability, accessibility, and quality) and people (e.g., their expectations and relationships within the communities) [12]. The degree of provider accountability to other actors shapes their discretion to address people's expectations or their receptivity to people's concerns, thus highlighting the importance of going beyond the health service-focused interpretation of responsiveness and underlines the significance of interactions among providers, managers and policy-makers in shaping the system's responsiveness [12].

Perception on the Objectives of Implementing the Health Financing System

The findings here reveal that people are not in agreement with whatever the objectives of health care financing system is in Nigeria. This speaks to the exertion that the people need to be carried along in everything that concerns them. Improvement in transparency and accountability of the health system to the population is that the entitlements and obligations of the population should be well understood by all, reflecting the promise by the specific authority to the people. The key message is that in addition to the periodic reporting by the relevant authorities to the people on the extent to which progress is being made, there should be active and meaningful involvement of all relevant stakeholder representatives.

Dimensions of accountability range from (relatively simple) tracking and reporting on financial resources (e.g., audit), to (more complex) reporting on performance relative to some agreed measures, to (most complex) enhancing the legitimacy of the government in the eyes of the people [11].

Perception on the Mechanisms Commonly used for Implementing the Health Financing Systems in Nigeria

Out-of-pocket expenditure has been reported as the mechanism commonly used for implementing a health financing system in Nigeria. This is in line with the report of the World Bank that data suggest that of the 2019 global population of 7.674 billion people, many suffer financial catastrophe every year due to out-of-pocket (OOP) health expenditures [5]. It is also reported that about 925 million people expend more than 10% of their household income on health care, and over 200 million expend more than 25% (so-called 'catastrophic' expenditures) [6]. Nigeria has been shown to have among the highest out-of-pocket health spending and poorest health indicators in the world [7]. This however also contradicts the assertion that in Nigeria, several attempts to evaluate health financing mechanisms points to the fact that there has not been anyone mechanism that suits all situations.

Health is financed by public and private funds [14]. A major reliance on public, compulsory, prepaid funds is necessary to make progress toward universal health coverage (UHC). No country could have made significant progress towards attaining universal health coverage (UHC) without depending on a main share of public funds to finance health [15]. Equity in the utilization of health services and resources should be distributed according to need, not according to other factors such as people's ability to pay for services [11].

Perception Concerning the Objective of Pooling Resources for Health, the Objective of Purchasing Health Services and the Benefits of Implementing these Health Financing Systems

There is little or no knowledge regarding the objective of pooling resources for health as

making expenses on health more predictable or protecting households from paying nor do they perceive it as ensuring that people get health services they need or promoting equity in health care provision. Similarly, there is no knowledge of how the government secures health services for the populace or there is total lack of interest in what the government does and how it is done. In addition, knowledge of the benefits of implementing these health financing systems is shown not to be adequate. It has been reported that the 2014 Presidential Summit Declaration affirmed that UHC is key to ensuring equitable access to high-quality, affordable health care for all Nigerians [13]. Although the summit was built on a highly participatory stakeholder engagement process, its concomitant momentum has waned [13].

The way budgets are formed, allocated and used in the health sector is at the core of the UHC agenda [14]. A necessary condition to enable the effective implementation of health financing reforms towards the attainment of universal health coverage is said to be robust public participation in budgeting in the health sector. Considerations of politics and multiplicity of stakeholders shape the decision of a country's leadership to commit to UHC [2, 3]. The aim of monitoring of UHC by countries is to ensure that progress towards UHC reflects the country's unique demographic and epidemiological profile, the population's demands and expectations, status of the health system and level of economic development [4].

Conclusion

If Nigeria as a country is to sustain efforts towards economic growth while ensuring the attainment of the UHC as stipulated by WHO, Nigeria should develop and implement health financing policies that ensure contributions from relevant stakeholders aimed at:

1. Investing in individuals, families, and communities, ensuring capacity development that will enable their active and meaningful engagement in health issues thus optimizing their knowledge and health, as advocates for healthy policies, active co-developers of health and social services, and implementers of these services.
2. Evidence-based health policies and strategic actions across all sectors, involving all stakeholder groups.

Conflict of Interest

There is no conflict of interest to declare. The submission is original work and is not under review at any other publication.

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Normal Value Ranges of LV Deformation, Rotation and Twist Parameters in Healthy Adults by 4Dimensional XStrain Speckle Tracking Echocardiography

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Abstract

XStrain 4D Speckle tracking echocardiography is a novel approach to address both the strain deformation and rotational mechanics of LV. The aim was to comprehensively present the normal value ranges of LV strain and rotational parameters of healthy Indian adults after assessment with this innovative technique. The study population comprising of 80 adults (58 males, 22 females; Group A < 30 years, Group B > 31 years) is revealing the values of Global longitudinal strain (GLS), Global longitudinal strain rate (GLSR), Transverse strain (TS), Transverse strain rate (TSR), Shear and Shear rate are greater in men than in women ($p<0.01$) and moreover in Group A, Global Circumferential strain (GCS), Global Circumferential strain rate (GCSR), Global Radial strain and Global Radial strain rate (GRSR) were similarly higher in men. Peak apical rotation, peak twist, twist rate and untwist rate values were again greater in men ($p<0.01$) and increased with advancing age. This is the first study to present a candid and comprehensive analysis of extensive parameters of LV strain and rotational mechanics in healthy Indian adults.

Keywords: *4Dimensional XStrain echocardiography, LV rotational mechanics, LV twist and torsion, Speckle tracking echocardiography*

Introduction

Global longitudinal strain (GLS) is the most-studied two-dimensional speckle tracking echocardiography (2D-STE) parameter and is now part of routine assessment of numerous echocardiographic laboratories worldwide. GLS varied from -15.9 % to -22.1% in a meta-analysis of 24 studies, which included 2597 healthy participants [1]. After reviewing the abundant data on GLS, the American society of echocardiography suggested a valve of above -20 ±2 % to be normal [2]. The three-dimensional (3D) STE techniques are feasible enough to measure real-time volumetric data, strain components, LV rotation, twist and torsion, in all LV segments, from a single acquisition [3]. Even though 3D-STE overcomes significant limitations of 2D-STE, neverthless 3D-STE is challenging, as both the temporal and spatial resolution of 3D data set are inferior to 2D imaging, and there is a possibility of speckle decorrelation between subsequent volumes [4, 5].

Lower, in 1669, was the first to describe the twisting motion of the left ventricle (LV) [6]. LV rotational deformation resembles the wringing of a towel (Figure 1).

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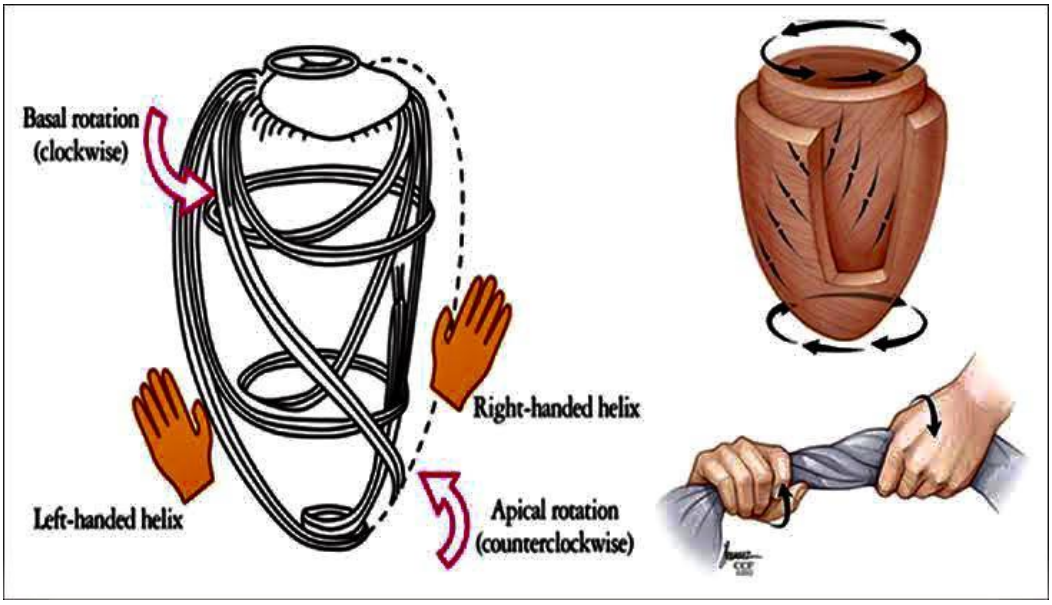

Figure 1. LV Twist

This wringing deformation is referred to as LV twist (LVT), and the subsequent recoil that occurs in diastole is referred to as LV untwist (LVUT) [7, 8]. Importantly, LV twist is the net difference between basal and apical rotation and LV torsion is derived by dividing the twist angle by the distance between LV apex and base (Figure 2).

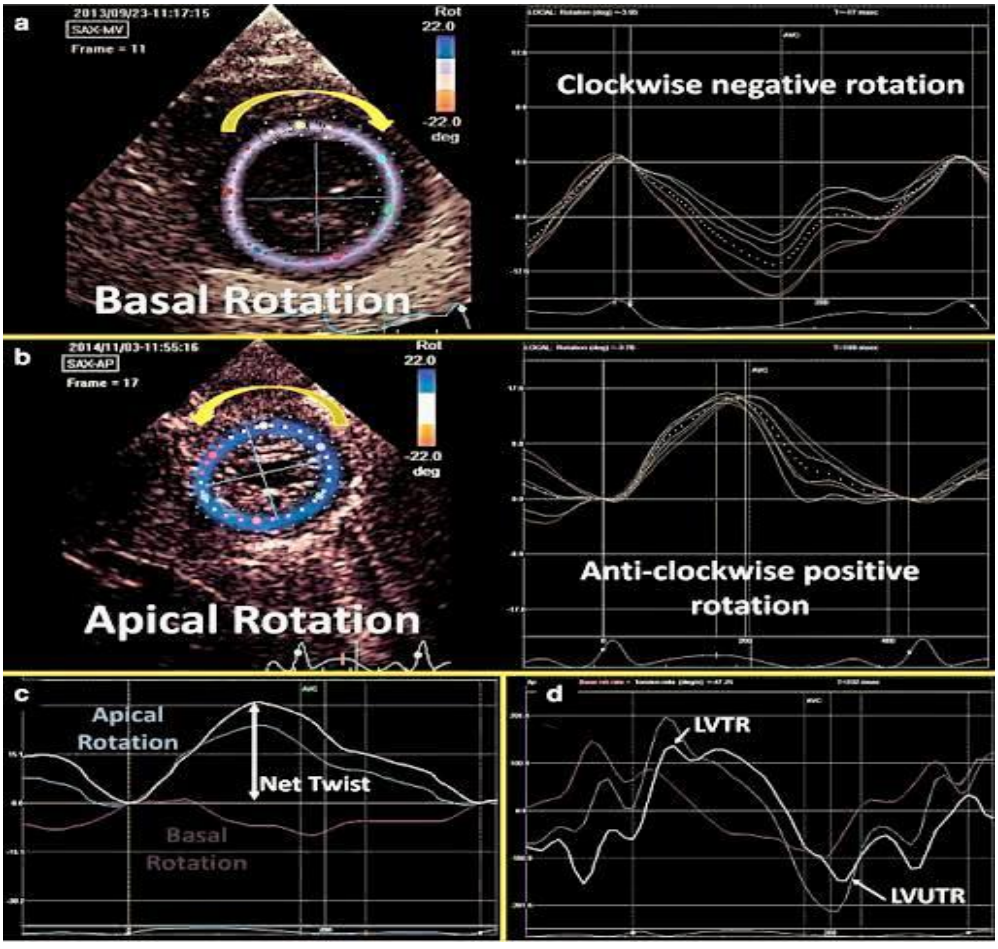

Figure 2. LV Apical, Basal Rotation, LVTR and LVUTR

XStrain 4D analysis is a novel approach that quantifies regional function from routine grayscale 2D echocardiographic images by fusing 2D speckle tracking information obtained from standard apical 4CH, 2CH, and LAX views and aims to make myocardial quantification imaging interpretation easier by the 3D/4D reconstruction of the LV. The user can freely rotate and zoom the Beutel and superimpose the echographic scanning planes to better evaluate the contractility properties of the LV, using a physiological tool to analyze the complex multi-dimensional LV mechanics [9] (Figure3).

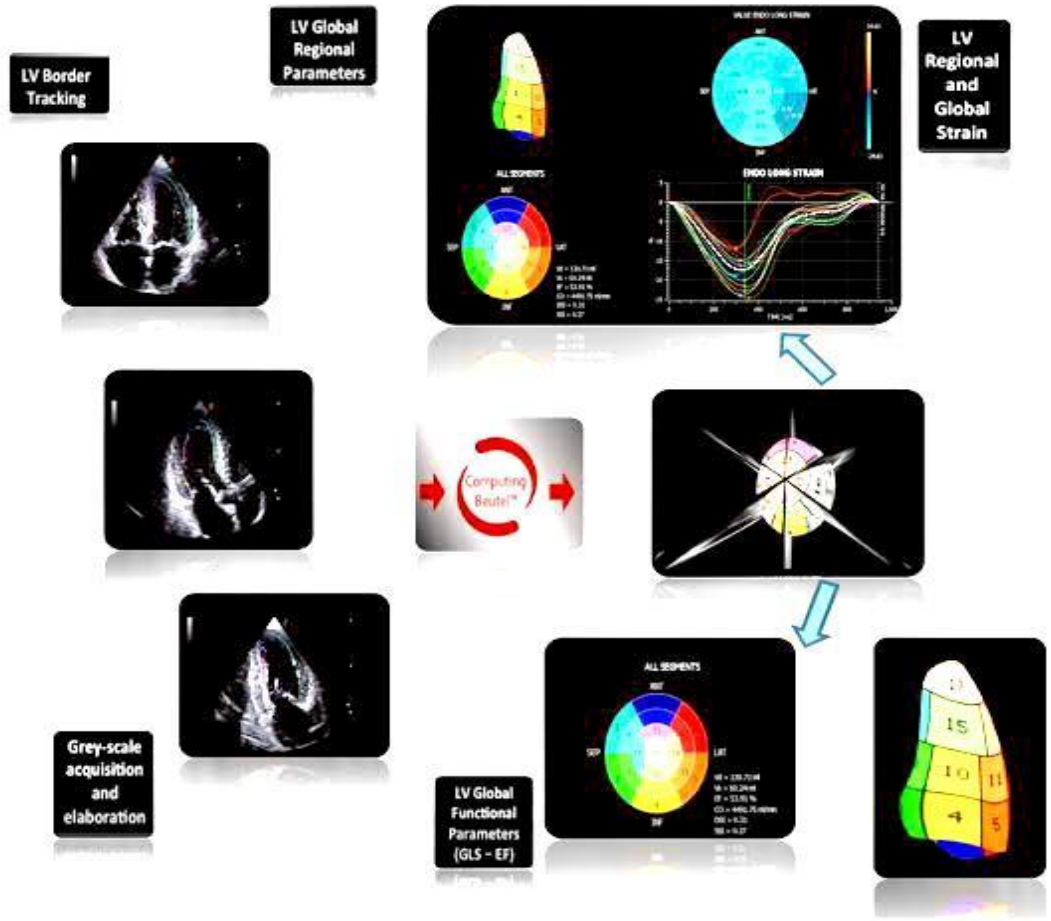

Figure 3. XStrain 4D global LV Strain Analysis

This innovative technology provides an additional effective and easy to use tool to add value to the traditional 2DE information and is especially emerging in this context. Utilizing LV border tracking XStrain4D delivers a more complete and intuitive picture of cardiac deformation behavior, providing temporal compensation for heart rate variations, spatial alignment of the 3 views in 3D space, and adaptation of a dynamic LV surface model. This tool, relying on the high spatial and temporal resolution of 2D imaging acquisitions, addresses and resolves the major limitations and criticalities currently related to the use of full-volume 3D STE [10-14]. Moreover, this advanced technique can analyse both deformation and rotational parameters meticulously, thoroughly, and accurately.

It has been advocated that eventually, a consolidated approach in which both changes in LV rotational mechanics and longitudinal shortening are vigorously evaluated and elucidated in an integrated way to establish the normal reference values [15-17]. The calculation of ventricular torsion from rotation and longitudinal strain by means of STE can provide

complementary information about systolic ventricular function in relation to the traditional parameters used in daily practice, such as LVEF [18].

However, to be clinically useful, all these new parameters of myocardial and LV function need reference values that can be compared with data obtained from patients with suspected myocardial diseases. To date, reference values for deformation and rotational parameters are limited, heterogeneous, and sometimes inconsistent [19-22].

Accordingly, we present comprehensive values of strain and rotational mechanics obtained with STE by 4D XStrain speckle tracking echocardiography in healthy Indian adults and moreover to assess their relationship with sex and age.

Material and Methods

Study Population & Design

The present study was conducted at Prakash heart station and diagnostic, Lucknow, India, an approved centre of Texila American University for the current PHD Cardiology program of the author. The contemporary work was reviewed and approved by the Research Ethics Committee of our institution, and all subjects gave written informed consent. The study comprised of 107 healthy adults from which 27 cases were excluded due to inferior image quality, and finally, 80 participants were enrolled after a careful selection process during a period spanning for 9 months from June 2021-Feb 2022.

The study population consisted of 80 healthy adults of age group 18-60 years of either sex. The study group was arbitrarily divided into two groups: Group A containing subjects of 18-30 years of age, and Group B consisting of 31-60 years. Those participants were included if they were asymptomatic with a normal physical examination, BMI-23 or less, waist size 85 cm^2 or less in men and 80 cm^2 or less in women, free from overt cardiovascular disease, not receiving any drugs, non-smoker, non-tobacco chewer, non-diabetic, non-hypertensive according to JNC-8 guidelines, having normal thyroid and lipid profile, normal resting ECG in sinus rhythm with a normal 2DE and Treadmill Stress ECG. Those individuals were excluded if there was a presence of diabetes mellitus, neurological or psychiatric illness, malignancy, CAD, Aortic root abnormalities and aortic dilatation, thyroid disease, valvular heart disease, history of cardiac rhythm abnormalities, heart failure, systemic hypertension and significant pulmonary hypertension.

Methods

All the study population individuals underwent full history taking, clinical examination and a standard resting 12 lead ECG.

Biochemical & Hormonal Assessment

Blood samples were withdrawn, in the morning, after 12 hours of overnight fasting for HBAIC, T3, T4, TSH, Serum creatinine, Serum uric acid, Total cholesterol (TC), Triglycerides (TG) & high-density cholesterol (HDL-C). Serum Low-density Lipoprotein cholesterol (LDL-C) was calculated according to Freidwald's formula [23].

Echocardiography

Echocardiographic examination was done employing My Lab X7 4D XStrain echocardiography machine of Esaote, Italy, equipped with a harmonic variable frequency (1-5 Mhz) electronic single-crystal array transducer, in left lateral decubitis position as recommended by American Society of Echocardiography [24] and connected to 3 lead ECG for continuous monitoring during the echocardiographic study.

Conventional Echocardiography

1. M-Mode: for measurements of wall thickness, dimensions, ejection fraction LV mass, LVEDV, LVESV, and Cardiac output (CO).
   a. LV mass was calculated using the Devereux formula [25].

2. Doppler flow: The mitral inflow velocities were recorded and the following.

b. Velocities were measured: peak velocity of early diastolic wave velocity (E), late diastolic wave velocity (A) and E/A ratio.

Doppler Tissue Imaging

1.5-mm sample volume was placed at the lateral mitral of the mitral annulus in an apical 4-chamber view. Analysis was performed for the measurements of early diastolic wave velocity (E') and E/E' ratio.

1. 4D XStrain speckle tracking echocardiography.

A minimum of 3 consecutive cardiac cycles were acquired for STE analysis.

a. Measurements of the global strain of the LV

Three LV apical long-axis views: apical four-chamber, two-chamber, and apical three-chamber views were acquired; these views were taken at a frame rate ranging 40-75 frames/sec and stored digitally on hard disk for off-line analysis by software package XStrain™ advanced technology with TOMTEC GMGH 3D/4D rendering and Beutel ™ computation compabilities [9]. The endocardial border of the LV was semi-automatically tracked and then the software automatically generated a second, larger, concentric tracing at the epicardium so that all the LV myocardium became included. Then, the software automatically transformed each LV view into 6 equal segments and performed the speckle-tracking on a frame-to-frame basis [26]. After outlining the left ventricular endocardium in all recorded projections, the computer marked the left ventricle muscle area and divided it into 17 segments and then plotted the curves of left ventricular strain. Mitral and aortic flow velocities were recorded using pulsed-wave Doppler to measure the timing of cardiac events.

b. Measurements of LV twist

A short axis view at the level of the mitral valve was obtained by tilting the probe slightly upward until we got the characteristic fish mouth appearance of the mitral valve, and an apical short-axis view was acquired by tilting the probe further upwards until we got a cross-section of the LV apex. Speckle-tracking imaging analysis was performed using the available software as mentioned earlier [9].

Using the average of LV rotations from the 6 segments, we measured the basal and apical rotation taking into consideration to measure the mean rotation at aortic valve closure. The apical rotation was expressed in positive values, while the basal rotation in negative values. LV twist equals the apical rotation minus the basal rotation. Rotation and twist are expressed in degrees. [26]. Following the acquisition, the parameters enumerated below will be evaluated:

Apical Long Axis

2CH View

a. Global longitudinal strain (%).
b. Global longitudinal strain Rate (1/s).
c. Longitudinal velocity (cm/s).
d. Transverse velocity (cm/s).
e. Transverse strain (%).
f. Transverse strain rate (1/s).
g. Shear (%).
h. Shear rate (1/s).

3 CH View

a. Global longitudinal strain (%).
b. Global longitudinal strain Rate (1/s).
c. Longitudinal velocity (cm/s).
d. Transverse velocity (cm/s).
e. Transverse strain (%).
f. Transverse strain rate (1/s).
g. Shear (%).
h. Shear rate (1/s).

4 CH View

a. Global longitudinal strain (%).
b. Global longitudinal strain Rate (1/s).
c. Longitudinal velocity (cm/s).
d. Transverse velocity (cm/s).
e. Transverse strain (%).
f. Transverse strain rate (1/s).

g. Shear (%).
h. Shear rate (1/s).

Short Axis

At LV apex

a. Apical Rotation - Peak (o).
b. Apical Rotation - Time to peak (ms).

At Mv level

a. Rotational velocity (^{o}/s).
b. Radial Velocity (cm/s).
c. Global Circumferential strain (GCS) (%).
d. Global Circumferential strain Rate (GCSR) (1/s).
e. Global Radial Strain (GRS) (%).
f. Global Radial Strain Rate (GRSR) (1/s).

At Pap. Muscle level

a. Rotational velocity (^{o}/s).
b. Radial Velocity (cm/s).
c. Global Circumferential strain (GCS) (%).
d. Global Circumferential strain Rate (GCSR) (1/s).
e. Global Radial Strain (GRS) (%).
f. Global Radial Strain Rate (GRSR) (1/s).

Twist Variables

a. Apical Rotation - Peak (o).
b. Apical Rotation -Time to peak (ms).
c. Basal Rotation - Peak (o).
d. Basal Rotation - Time to peak (ms).
e. Twist - Peak (o).
f. Twist -Time to peak (ms).
g. Twist Rate - Peak (^{o}/s).
h. Twist Rate -Time to peak (ms).
i. Untwist Rate -Peak (^{o}/s).
j. Untwist Rate -Time to peak (ms).
k. Rotational Velocity - (o/s)
l. Mv level
m. Pap. Muscle level.

Statistical Methods

The data were summarized as mean±SD. The 95% confidence interval (CI) of the mean was also calculated. The mean of male and female was tested by t-test for independent groups. The level of significance used was 0.05. A higher t-value having a probability smaller than 0.05 was marked significant. A p-value smaller than 0.01 was marked highly significant.

Results

Table 1 shows the demographic characteristics of the study population. A total of 80 healthy Indian adults were enrolled in the study, and males were 58 and females 22 mean age was 29.07±11.60 years in males and 34.64±10.42 years in females. Men had larger body surface area and body mass index than women.

Table 2 identifies the LA, LV geometry and function of the study population. The LA size was significantly higher in males as compared to females ($p<0.01$). LVEDV, LV mass, CO, Mitral E/A ratio, E/E' TDI ratio and 2D-EF % were significantly greater in males in comparison to females ($p<0.01$).

The 4Dimensional volumetric data presented in Table 3 also illustrates that LVEDV, 4D-EF, CO and CI are increased in males ($p<0.01$) along with sphericity index in diastole and systole ($p<0.01$).

The normal values of comprehensively accomplished strain parameters are expressed in Table 4. Global Longitudinal strain (GLS), Global longitudinal strain rate (GLSR), longitudinal velocity, Transverse velocity, Transverse strain (TS), Transverse strain rate (TSR), shear and shear rate are significantly greater in males in comparison to females, in apical 2CH, 3CH and 4CH views ($p<0.01$). Similarly, the majority of these parameters are higher in Group A, comprising of subjects < 30 years of age, when compared to Group B, which consisted of > 31 years of age.

Table 5 demonstrates in short-axis views at the mitral valve and papillary muscles level the Global Circumferential Strain (GCS), Global Circumferential Strain rate (GCSR), Global Radial Strain (GRS), Global Radial Strain rate (GRSR), Radial and rotational velocity were higher in men as compared to women, even though GCSR, GRS, GRSR and rotational

velocity valves were homogenous (p = NS) in Group A and Group B at the mitral valve level. Moreover, these values are significantly greater in Group A in comparison to Group B (p<0.01) at the papillary muscle level.

Despite 80 healthy adults being enrolled in the current study, LV rotation and twist parameters could be satisfactorily procured in 65 subjects from short-axis views, at the level of LV apex, mitral valve, and papillary muscles (Table 6). Peak apical rotation, peak twist, peak twist and untwist rate and their Time to peak were significantly increased (p<0.01) in males in comparison to females. In Group B, values of basal rotation, twist and untwist rate was higher in comparison to Group A (p<0.01). Thus, the twist was greater is normal healthy men and the values increased with increasing age (p<0.01).

Table 1. Demographic Data(n=80)

Variables	**Male(N-58)**	**Female(N-22)**	**Age wise Group (Years)**	
	Mean ± SD	**Mean ± SD**	**Group A***	**Group B***
			(n=45)	**(n=35)**
Age (YRS)	29.07 ± 11.60	34.64 ± 10.42	22.47 ± 4.14	41.06 ± 9.21
Weight (kg)	64.40 ± 10.56	56.55 ± 10.65	59.67 ± 10.22	65.54 ± 11.44
HT (cm)	167.76 ± 6.15	159.18 ± 8.84	165.04 ± 6.35	165.86 ± 9.67
BSA(M2)	1.73 ± 0.15	1.57 ± 0.18	1.65 ± 0.15	1.73 ± 0.19
BMI	22.80 ± 2.94	22.17 ± 2.87	21.81 ± 2.94	23.66 ± 2.58
SBP (mmhg)	118.38 ± 10.70	118.45 ± 11.38	114.93 ± 10.59	122.86 ± 9.52
DBP (mmhg)	76.66 ± 6.84	76.82 ± 6.46	74.58 ± 6.56	79.43 ± 5.91
Heart Rate (bpm)	77.16 ± 12.04	84.77 ± 15.68	78.69 ± 12.41	79.97 ± 14.89
NS=Not Significant(p>0.05)				
** Highly Significant=(p<0.01)				
* Significant=(p<0.05)				
Group A:18 to 30 years of age				
Group B:31 to 60 years of age				

Table 2. Conventional Echocardiography Data (n=80)

Variables	**Male(N-58)**	**Female(N-22)**	**P**		**Age wise Group (Years)**		**P**	
	Mean ± SD	**Mean ± SD**	**P-Val.**	**Sign.**	**Group A***	**Group B***	**P-Val.**	**Sign.**
					(n=45)	**(n=35)**		
EPSS (mm)	0.57 ± 0.25	0.66 ± 0.40	<0.01	**	0.58 ± 0.32	0.61 ± 0.26	0.12	NS
Left Atrium (cm)	2.81 ± 0.56	2.72 ± 0.49	<0.01	**	2.63 ± 0.44	2.97 ± 0.61	0.14	NS
IVS d (cm)	0.76 ± 0.17	0.73 ± 0.13	<0.01	**	0.72 ± 0.17	0.79 ± 0.15	0.07	NS
LVID d (cm)	4.80 ± 0.41	4.45 ± 0.47	<0.01	**	4.65 ± 0.46	4.77 ± 0.45	<0.01	**
LVPW d (cm)	0.80 ± 0.14	0.73 ± 0.13	<0.01	**	0.73 ± 0.13	0.83 ± 0.13	0.13	NS
LVEDV (ml)	76.02 ± 51.94	32.64 ± 44.94	<0.01	**	80.17 ± 46.94	43.43 ± 54.96	<0.01	**
LV MASS d (gm)	124.09 ± 32.38	101.14 ± 30.91	<0.01	**	108.87 ± 27.84	129.23 ± 36.76	0.42	NS
C.O.(L/min)	5.20 ± 1.42	5.31 ± 2.02	<0.01	**	4.98 ± 1.39	5.56 ± 1.79	0.17	NS
E/A RATIO	1.58 ± 0.58	1.34 ± 0.54	<0.01	**	1.79 ± 0.54	1.16 ± 0.39	<0.01	**
Lateral TDI E’	10.68 ± 7.15	5.09 ± 6.62	<0.01	**	12.34 ± 6.94	5.03 ± 5.85	<0.01	**
Lateral TDI E/E’ Ratio	0.23 ± 0.30	0.50 ± 0.48	0.55	NS	0.19 ± 0.33	0.46 ± 0.38	<0.05	*
2D-EF (%)	0.63 ± 0.07	0.69 ± 0.07	<0.01	**	0.64 ± 0.08	0.64 ± 0.08	<0.01	**
NS=Not Significant(p>0.05)								
** Highly Significant=(p<0.01)								
* Significant=(p<0.05)								
Group A:18 to 30 years of age								
Group B:31 to 60 years of age								

Table 3. 4-Dimensional Volumetric Data (n=80)

Variables	Male(N-58)	Female(N-22)	P		Age wise Group (Years)		P	
	Mean ± SD	Mean ± SD	P-Val.	Sign.	Group A* (n=45)	Group B* (n=35)	P-Val.	Sign.
Sphericity Index d	0.46 ± 0.11	0.43 ± 0.10	<0.01	**	0.46 ± 0.12	0.44 ± 0.10	<0.01	**
Sphericity Index s	0.38 ± 0.11	0.36 ± 0.12	<0.01	**	0.39 ± 0.12	0.36 ± 0.10	<0.01	**
LVEDV (ml)	74.47 ± 17.88	72.10 ± 16.96	<0.01	**	72.08 ± 19.09	76.06 ± 15.34	0.03	*
LVESV (ml)	32.93 ± 9.39	31.95± 10.06	<0.01	**	32.61 ± 9.93	32.73 ± 9.11	<0.01	**
EF (%)	56.33 ± 5.56	56.45 ± 6.44	<0.01	**	55.47 ± 5.58	57.51 ± 5.89	<0.01	**
CO(L/min)	3.17 ± 0.82	3.23 ± 0.95	<0.01	**	3.07 ± 0.82	3.33 ± 0.89	0.08	NS
Cardiac Index(L/mm/m2)	1.84 ± 0.47	2.05 ± 0.52	<0.01	**	1.86 ± 0.47	1.94 ± 0.51	0.03	*
NS=Not Significant(p>0.05)								
** Highly Significant=(p<0.01)								
* Significant=(p<0.05)								
Group A:18 to 30 years of age								
Group B:31 to 60 years of age								

Table 4. LV Strain Parameters-Part-1(n=80)

Apical long axis views	Variables	Male(N-58)	Female(N-22)	P		Age wise Group (Years)		P	
		Mean ± SD	Mean ± SD	P-Val.	Sign.	Group A*	Group B*	P-Val.	Sign.
2 CH View	Global longitudinal strain (%)	-20.83 ± 4.16	-20.72 ± 3.51	<0.01	**	-21.13 ± 3.39	-20.37 ± 4.62	<0.01	**
	Global longitudinal strain Rate (1/s)	-1.79 ± 0.49	-1.75 ± 0.42	<0.01	**	-1.84 ± 0.49	-1.70 ± 0.44	<0.01	**
	Longitudinal velocity (cm/s)	0.43 ± 0.11	0.42 ± 0.13	<0.01	**	0.45 ± 0.10	0.40 ± 0.13	<0.01	**
	Transverse velocity (cm/s)	0.38 ± 0.08	0.36 ± 0.07	<0.01	**	0.38 ± 0.07	0.38 ± 0.09	<0.01	**
	Transverse strain (%)	24.29 ± 8.83	29.62 ± 10.79	<0.01	**	25.05 ± 8.84	26.67 ± 10.65	0.09	NS
	Transverse strain rate (1/s)	2.82 ± 0.94	2.69 ± 0.72	<0.01	**	2.72 ± 0.86	2.86 ± 0.91	<0.05	*
	Shear (%)	0.12 ± 0.06	0.13 ± 0.06	<0.01	**	0.13 ± 0.06	0.11 ± 0.05	<0.01	**

	Shear rate (1/s)	2.26 ± 0.99	1.99 ± 0.68	<0.01	**	2.20 ± 0.76	2.17 ± 1.10	<0.05	*
3 CH View	Global longitudinal strain **(**%)	-17.38 ± 3.17	-18.92 ± 3.42	<0.01	**	-17.52 ± 2.92	-18.16 ± 3.73	<0.05	*
	Global longitudinal strainRate (1/s)	-1.67 ± 0.39	-1.60 ± 0.38	<0.01	**	-1.68 ± 0.38	-1.61 ± 0.39	<0.01	**
	Longitudinal velocity (cm/s)	0.43 ± 0.13	1.42 ± 5.04	0.79	NS	0.95 ± 3.52	0.37 ± 0.08	0.21	NS
	Transverse velocity (cm/s)	0.35 ± 0.07	0.34 ± 0.08	<0.01	**	0.33 ± 0.07	0.35 ± 0.07	<0.05	*
	Transverse strain (%)	25.15 ± 7.54	27.42 ± 9.65	<0.01	**	23.35± 8.67	28.89 ± 6.33	0.71	NS
	Transverse strain rate (1/s)	2.48 ± 0.58	2.50 ± 0.64	<0.01	**	2.39 ± 0.63	2.62 ± 0.52	0.09	NS
	Shear (%)	0.10 ± 0.04	0.12 ± 0.07	<0.01	**	0.11 ± 0.06	0.10 ± 0.04	<0.01	**
	Shear rate (1/s)	2.24 ± 0.76	2.14 ± 0.71	<0.01	**	2.29 ± 0.82	2.12 ± 0.63	<0.01	**
4 CH View	Global longitudinal strain **(**%)	-19.12 ± 3.91	-18.59 ± 4.97	<0.01	**	-19.00 ± 3.56	-18.94 ± 4.96	<0.01	**
	Global longitudinal strainRate (1/s)	-1.64 ± 0.32	-1.49 ± 0.41	<0.01	**	-1.62 ± 0.36	-1.58 ± 0.33	<0.01	**
	Longitudinal velocity (cm/s)	0.42 ± 0.10	0.39 ± 0.13	<0.01	**	0.44 ± 0.11	0.37 ± 0.09	<0.01	**
	Transverse velocity (cm/s)	0.36 ± 0.07	0.33 ± 0.08	<0.01	**	0.34 ± 0.08	0.35 ± 0.07	<0.01	**
	Transverse strain (%)	24.04 ± 8.83	26.94 ± 11.15	<0.01	**	23.95 ± 8.79	25.98 ± 10.46	0.14	NS
	Transverse strain rate (1/s)	2.50 ± 0.78	2.71 ± 1.59	<0.01	**	2.41 ± 0.76	2.74 ± 1.34	0.31	NS
	Shear (%)	0.15 ± 0.06	0.14 ± 0.06	<0.01	**	0.15 ± 0.06	0.15 ± 0.06	0.07	NS
	Shear rate (1/s)	2.07 ± 0.51	1.92 ± 0.72	<0.01	**	2.08 ± 0.57	1.95 ± 0.59	<0.01	**
NS=Not Significant(p>0.05)									
** Highly Significant=(p<0.01)									
* Significant=(p<0.05)									
Group A:18 to 30 years of age									
Group B:31 to 60 years of age									

Table 5. LV Strain Parameters-Part-2(n=80)

Short axis views	Variables	Male(N-58)	Female(N-22)	P		Age wise Group (Years)		P	
		Mean ± SD	Mean ± SD	P-Val.	Sign.	Group A* (n=45)	Group B* (n=35)	P-Val.	Sign.
At LV apex	Apical Rotation - Peak (o)	Values Presented in Table 6							
	Apical Rotation - Time to peak (ms)								
At mv level	Rotational velocity (^{o}/s)	-111.61 ± 57.23	-93.96 ± 60.67	<0.01	**	-106.52 ± 68.37	-107.06 ± 43.14	0.09	NS
	Radial Velocity (cm/s)	0.41 ± 0.12	0.38 ± 0.12	<0.01	**	0.39 ± 0.13	0.42 ± 0.10	<0.05	*
	Global Circumferential strain (GCS) (%)	-16.71 ± 6.55	-15.88 ± 6.01	<0.01	**	-15.46 ± 6.44	-17.79 ± 6.16	0.34	NS
	Global Circumferential strain Rate (GCSR) (1/s)	-2.21 ± 0.79	-2.12 ± 0.82	<0.01	**	-2.16 ± 0.84	-2.23 ± 0.73	<0.05	*
	Global Radial Strain (GRS) (%)	23.11 ± 11.75	18.33 ± 6.70	<0.01	**	20.99 ± 11.51	22.83 ± 9.82	0.21	NS
	Global Radial Strain Rate (GRSR) (1/s)	3.12 ± 0.87	3.01 ± 1.04	<0.01	**	2.97 ± 0.95	3.25 ± 0.84	0.10	NS
At pap. muscle level	Rotational velocity (^{o}/s)	96.47 ± 39.37	99.30 ± 29.79	<0.01	**	97.88 ± 38.54	96.44 ± 35.02	<0.05	*
	Radial Velocity (cm/s)	0.38 ± 0.09	0.40 ± 0.13	<0.01	**	0.39 ± 0.09	0.39 ± 0.11	<0.01	**
	Global Circumferential strain (GCS) (%)	-23.13 ± 6.52	-22.76 ± 7.06	<0.01	**	-23.66 ± 6.74	-22.22 ± 6.49	<0.01	**
	Global Circumferential strain Rate (GCSR) (1/s)	-1.95 ± 0.46	-2.03 ± 0.47	<0.01	**	-1.99 ± 0.47	-1.95 ± 0.46	<0.01	**
	Global Radial Strain (GRS) (%)	25.10 ± 9.93	23.54 ± 11.07	<0.01	**	24.80 ± 9.72	24.50 ± 10.95	<0.05	*
	Global Radial Strain Rate (GRSR) (1/s)	2.63 ± 0.96	2.78 ± 1.06	<0.01	**	2.71 ± 1.03	2.63 ± 0.92	<0.01	**

NS=Not Significant(p>0.05)

** Highly Significant=(p<0.01)

* Significant=(p<0.05)

Group A:18 to 30 years of age

Group B:31 to 60 years of age

Table 6. Rotation and Twist Data(n=65)

Variables	**Male(N-51)**	**Female(N-14)**	**P**		**Age wise Group (Years)**		**P**	
	Mean ± SD	**Mean ± SD**	**P-Val.**	**Sign.**	**Group A***	**Group B***	**P-Val.**	**Sign.**
					(n=39)	**(n=26)**		
Apical rotation peak(o)	6.32 ± 3.95	5.64 ± 2.28	<0.01	**	6.45 ± 4.03	5.74 ± 3.01	<0.01	**
Time to Peak (ms)	267.09 ± 166.26	266.86 ± 85.37	<0.01	**	252.83 ± 158.40	288.35 ± 141.96	0.12	NS
Basal rotation peak(o)	-6.51 ± 3.63	-6.76 ± 2.81	<0.01	**	-6.44 ± 4.02	-6.75 ± 2.44	<0.05	*
Time to Peak (ms)	345.33 ± 172.25	345.07 ± 101.66	<0.01	**	362.25 ± 179.69	319.81 ± 120.46	<0.01	**
Twist peak(o)	10.89 ± 5.50	10.67 ± 3.94	<0.01	**	10.77 ± 5.86	10.94 ± 4.04	<0.01	**
Time to Peak (ms)	309.75 ± 169.76	307.43 ± 82.24	<0.01	**	305.21 ± 178.07	315.31 ± 113.57	<0.05	*
Twist Rate peak(o/s)	124.38 ± 61.87	99.96 ± 23.37	<0.01	**	127.70 ± 67.17	106.26 ± 32.53	<0.01	**
Time to Peak (ms)	197.09 ± 185.30	138.00 ± 90.50	<0.01	**	206.53 ± 189.89	151.12 ± 133.18	<0.01	**
Untwist Rate peak(o/s)	-116.35 ± 51.71	-107.57 ± 38.35	<0.01	**	-113.67 ± 49.06	-115.65 ± 49.86	<0.01	**
Time to Peak (ms)	364.29 ± 168.25	347.21 ± 170.35	<0.01	**	314.36 ± 156.92	430.00 ± 161.44	0.55	NS
NS=Not Significant(p>0.05)								
** Highly Significant=(p<0.01)								
* Significant=(p<0.05)								
Group A:18 to 30 years of age								
Group B:31 to 60 years of age								

Discussion

We are presenting a comprehensive assessment of LV mechanics in healthy Indian adults, including data about the myocardial strain and rotational mechanics, and the impact of age and sex on these parameters, by employing a novel method of 4Dimensional XStrain speckle tracking echocardiography. In this way, we intend to provide an extensive picture of the physiological components involved in ventricular contraction. STE has been widely studied in recent times and has been found to be a pragmatic, convenient, and highly effective tool for the analysis of cardiac functions [27], enabling every myocardial segment to be visualized as a distinctive and exclusive speckle pattern and thus allowing to discriminate from other segments during the cardiac cycle. STE is distantly related to LV myocardial function, and thus the mechanism of contraction components are described as longitudinal, circumferential shortening, radial thickening, and rotational alteration [28].

Several studies have underlined that cardiac torsion is because of the presence of unique obliquely oriented muscle fibers in the subendocardium, which with the cardiac contraction, gradually place themselves in the opposite direction to the subepicardium [29, 30]. This peculiar spiral double helix-like structure, seems to be fundamental for both cardiac systolic and diastolic function [31-33]. Torrent-Guasp in the 1960s, highlighted simultaneous systolic rotation in the opposite direction between LV apex and base, around the longitudinal axis [33]. Ventricular torsion is induced by the synchronous movement of the ventricular base towards the apex [34]. Therefore, simultaneous and combined action of ventricular rotation and longitudinal shortening gives rise to ventricular contraction [34]. LV dysfunction may not affect these two mechanisms in the same way [35], and their assessment may be important in clinical practice because they may be detected early in pathological states where the classical hemodynamic parameters and unable to identify them [36-38].

Trials in patients with heart failure with preserved ejection fraction (HFpEF) have shown that LVEF and global circumferential strain, the chief predictor of LV twist, is conserved suggesting it acted as a compensatory mechanism [39, 40, 41]. Moreover, longitudinal strain (LS) is the most important prognosticator of CV death and/or heart failure [42, 43]. Hence, considering the fact that both LV myocardial strain and rotational mechanics are harmoniously involved in the dynamic functions of LV. Thus integration of complementary parameters of pumping (EF) and myocardial function (strain and twist) must be attempted to comprehensively bring forward the normal value ranges of these essential parameters of LV contractile function.

There is a lot of inconsistencies in the reference values for GLS, GCS, and GRS. Marwick et al. [21] enrolled 242 healthy individuals and found normal global LV GLS of – 18.6%. [20] demonstrated regional reference values for global GLS and found that GLS was lower in basal segments and showed a significant increase from base to apex. The authors concluded a global GLS of-20.6% in their cohort of a normal healthy population. According to a recent meta-analysis that included 24 studies with a total of 2597 subjects' normal values of GLS were -19.7%, normal GLS were -23.2 %, and GRS was 47.3 %. Moreover, they found that all directional components of strain showed heterogeneity and inconsistency between studies. We found similar values of GLS and GCS reported in the literature. Our GRS data are lower to those reported in the literature but there was a large inconsistency of data in the earlier studies. This may be explained by technical rather than biological factors. The GRS is a rather inaccurate measure, especially in lateral and basal segments, because the distance between the endocardium and epicardium is

small and the spatial resolution in this tracking direction is reduced.

The effects of age on myocardial deformation remains controversial, while some studies have shown reduced strain values with increasing age [24, 25]. Others have reported no change [20, 46, 47]. In a very recent study, [48] reported that GLS became less negative with aging while GCS became more negative, and the GRS remained unchanged. Similarly, [49] reported that GLS became less negative in elderly patients, but there was no significant change in GRS and GCS. Another study used three-dimensional magnetic resonance imaging using tissue tagging and compared healthy adults by age and reported less negative GLS and GCS in the elderly with a change that was larger at the apex than at the base [50]. In our study population, GLS was having higher in Group A in comparison to Group B. GCS and GRS were higher In Group B at the mitral valve level, and conversely, at the papillary muscle level, GCS and GRS were higher in Group A.

The effect of sex on LV myocardial deformation remains controversial. Several studies found no difference in strain measurements between men and women [21, 46, 47, 51]. However, [44] reported higher GRS in women than in men. Recently, [52] found that, on average, GLS was more negative in women than in men. [22] found that global GLS and GCS were significantly more negative in women than in men. These findings were confirmed by [20], who reported more negative GLS in women. Finally, the HUNT study showed that myocardial deformation was consistently higher in women [45]. On the contrary, our data shows that GLS, GCS and GRS values were higher in men.

Both LV rotation and torsion have been demonstrated to be important determinants of LV function [53]. Apical rotation is usually greater than basal rotation and more strictly correlated with global LV function [54]. [19] reported normal values in different age groups. They found that basal and apical rotation were 4.9 ± 2.0^{o} and 10.1 ± 1.9^{o}, respectively in 20 normal individuals between 33 years and 40 years old. Our data show higher values of LV rotation at the apex and lower values of basal rotation. The reasons for these differences are difficult to explain, however, an ethnic factor cannot be excluded.

A Study [20] have emphasized the importance of acquisition of LV apical short-axis view because the measurements can vary if the view is taken few millimeters more towards the LV apex. We have taken great care to obtain the most apical (just before the right ventricular apex disappears) and circular view. A study [55] reported that the twist changed substantially after 40 years to age. In our study, the LV twist values were 10.89 ± 5.50^{o} in males and 10.67 ± 3.94^{o} in females ($p<0.01$), and these values increased significantly in the 31 – 60-year age group ($p<0.01$), similar to the finding of Maharaj et al. This increase is likely related to an imbalance between subendocardial and subepicardial layers, with a greater preponderance of epicardial fibers with increasing age [56]. The authors recommend, in future, studies need to adopt a combined approach in which changes in LV rotational mechanics and longitudinal shortening are considered and interpreted together. Additionally, the integration of complementary parameters of pumping and myocardial function should be considered for a more accurate evaluation of the LV systolic function.

Conclusion

After a comprehensive assessment of myocardial deformation LV rotational mechanics in a modest cohort of healthy Indian adults, we are displaying the normal value ranges of the abundant data available in the present research work. In our study, GLS was higher in <30 years age group and GCS and GRS were higher in >31 years age group at the mitral valve level. Moreover, GLS, GCS and GRS values were increased in men. Furthermore, LV twist values were higher in males, and they

significantly increased in the 31-60 years age group.

The novel method of 4D XStrain speckle tracking echocardiography is feasible to assess the LV myocardial deformation and rotational mechanics, bringing new insights into this complex ventricular motion. Whereas further investigations are needed to validate this promising technology.

Limitations

The current study has a few limitations. All the participants are of Indian ethnicity, and therefore, the normal values ranges of the present study cannot be anticipated to be identical with other ethnic groups. The echocardiography machine used has an important bearing for the evaluation of deformation values, and these values may change according to the echocardiography system and the offline software being employed for tracking the endocardial border [57]. Other concerning limitation is the non standardisation of the speckle tracking deformation values across different vendors, because of which the strain and rotational values acquired will vary [58]. Moreover, we did not validate the accuracy of strain measurements against the reference standards, such as MRI.

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Conflict of Interest

There are no conflicts of interest.

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Factors Associated with Viral Load Suppression amongst People Living with HIV on Highly Active Anti-retroviral Therapy [Haart] at Kaloko, Chipulukusu and Kantolomba Art Health Facilities of Ndola District

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Abstract

It is important to monitor HIV clients in ART treatment using viral load testing in an effort to meet the third 95 strategy of UNAIDS 95-95-95, which is viral load suppression. The target "95-95-95" strategy is expected to be achieved by 2030. Unfortunately, there is insufficient regional data, especially in the third "95". Screening for viral load in low- and middle-income countries allows VLS monitoring of individual categories and demographics, necessary to achieve global epidemic control. The aim of this study was to find progress in the three [3] rural health centers in Ndola District on the achievement of VLS among HIV-positive patients on ART and related factors affecting the program. Sociodemography data, including age, gender, drug type and duration of treatment and laboratory variability [current viral load results], were extracted from client records using the SmartCare system. VL suppression and failure are determined using WHO definitions [viral pressure such as viral load <1000 copies/ml and virologic failure ≥1000 copies/ml]. Regular clinic [used as a proxy for adherence to medication and medication] will be defined as monthly clinical access to HAART treatment and other clinical management over the past 12 months.

Keywords: *ART, HIV, Suppression, SmartCare, Viral load.*

Introduction

The HIV epidemic has been a major public health concern not only in Africa but also across the world. The World Health Organization [WHO] report has estimated that 37.7 million people were living with HIV by the end of 2020 and that more than 25.4 million of people living with the virus live in the WHO Region [1]. ART therapy has been among the responses to HIV infection epidemic control for people living with HIV, and anti-retroviral drugs (ARVs) remain the only known treatment for HIV in people living with HIV. The combination of ART drugs should be taken daily in a consistent manner in order to achieve viral load suppression [2]. The term "Undetectable viral load" is where HIV copies are less than 50 copies of HIV per milliliter of blood [<50 copies / mL] [3].

The suppressed VL helps ensure that HIV-positive people living with HIV will not transmit HIV sexually even when they fail to take precautionary measures such as wearing condoms, sharing needles, abstinence, or mother-to-child transmission during pregnancy, birth or breastfeeding. [2, 4]. Part of the goal of the Joint United Nations Program on HIV / AIDS [UNAIDS] is to eradicate the HIV / AIDS epidemic by 2030, and that 95.0% of all people receiving anti-retroviral treatment [ART] are virally suppressed [5].

The aim of policymakers in the fight against the HIV epidemic is for everyone living with HIV to have a suppressed viral load, but this is not always possible. Of the people living with HIV in the African Region in 2018, just over half [52.0%] have had a suppressed viral load [6].

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The ZAMPHIA 2016 report revealed that VL suppression in HIV-positive people in Zambia was highest in adults: 73.5% in HIV-positive women and 73.0% in HIV-positive men aged 45 to 59 years. In addition, ZAMPHIA of 2016 revealed that VL suppression is much lower in young adults: 34.0% for HIV-positive women and 35.7% for HIV-positive men aged 15 to 24 years. In addition, ZAMPHIA data for 2016 showed a difference in VL suppression across all administrative provinces, from 50.0% in the Northern Province to 67.0% in the Eastern Province, at 15 to 59 years of age.

Although these statistics show that we are achieving the goal of achieving VL suppression in people living with HIV, the rates are surprisingly low. It is important to investigate the factors that affect the achievement of the goal of finding VL suppression among all people living with the virus and on ART.

Among the things that are believed to be associated with VL pressure are ignorance of HIV status, gender, duration on ART, initial CD4 T cell count, WHO class, type of ART, adherence to treatment, and simultaneous TB infection [8]. In addition, a history of loss of follow-up and educational status, as well as treatment regimens, may have related characteristics [8, 9].

There has been an increase in ART activities in Zambia over the years and VL monitoring is required to evaluate the effectiveness of this program. This study aims to determine the prevalence of VL suppression in some ART centers in Ndola Zambia, namely Chipulukusu, Kaloko and Kantolomba, and testing whether age and gender are associated with VL suppression in these selected ART facilities.

The findings may provide a basis for informing policy and strategies to improve care in Ndola Zambia.

Problem Statement

Despite gain made towards achieving VL suppression in PLHIV by increasing access to ART, VL suppression remains alarmingly low. Among the PLHIV in the African Region in 2018, only slightly over half [52.0%] had a suppressed viral load [6]. The picture among PLHIV currently on ART is better; for ages 15 to 59 years, PLHIV who self-reported current use of ART, 89.2% are virally suppressed: 89.7% of HIV-positive females and 88.2% of HIV-positive males [7].

With the aim of achieving VL suppression in every patient on ART, the 10.8% overall, 10.3% among HIV-positive females and 11.8% among HIV-negative males represent the population of major concern as they have the potential to trigger an upsurge in transmissions.

The potential for future growth in HIV transmission remains strong if control measures are not put in place. Without appropriate control measures, the affected people will continue to be a source of transmission.

There is need to put in place control measures that would improve outcomes of ART in this population, but the measures need to be based on statistical evidence. Such evidence remains scanty.

This study addressed the problem of scanty information, specifically for the populations served through Chipulukusu, Kaloko and Kantolomba ART clinics.

Study Justification

The study aims to add to the literature and contribute to public health knowledge by studying factors associated with viral load suppression in a group of ART clients that have been on treatment for more than 6 months at 3 selected rural health facilities in the Ndola District.

It is my hope that the findings of this study will be used to influence policy and, therefore, direct focus on the development of programs and interventions that will encourage people living with HIV / AIDS to achieve and live with undetectable levels of HIV and successful, productive life.

This study also intends to compare factors that contribute to Viral load Suppression

between people living with HIV in Africa and other parts of the world.

Literature Review

According to a review of the 2019 WHO report, monitoring the HIV response program is important to ensure high-quality care and high clinical outcomes for people living with HIV. Increased monitoring of viral load in the blood plays an important role in monitoring both individual response to anti-retroviral therapy and efficacy in achieving program goals [10]. The main goal for all program owners is for everyone with HIV in their ART program to attain VL suppression.

Viral Load Testing

In order to have efficient Viral load testing systems; it is important to have quality control systems within the laboratory that requires well-functioning sample referral networks, consistent processes driven by healthcare providers; Quality Data systems, Quality assurance and control as well as improved courier systems and mechanisms to handle specimen collection, a robust Data management and analysis team that can report accurately and allow for a timely interpretation of results by clinical staff.

We have observed that a number of countries are now scaling up viral load testing and tracking of suppressed viral loads among people living with HIV receiving anti-retroviral therapy is cardinal to appreciate whether progress is being made. This requires monitoring and evaluation plans set up that will help to measure the success of the Viral load programme in terms of implementation and clinical outcomes.

Coordination, collaboration and communication is cardinal in routine viral load monitoring and evaluation data and systems. This requires:

1. A well set up laboratory, clinical, and monitoring and evaluation team,
2. Data systems at the facility level, well functioning laboratories and,
3. Efficient data capture as well as monitoring and evaluation tools.

The relevance of robust monitoring and evaluation plans cannot be re-emphasized; these M & E systems require clear data flow that is easy to understand, data elements used in the program, and indicators (and their definitions) for viral load monitoring.

Using viral load data is important for client-level and programme-level decision-making and should be emphasized in monitoring and evaluation plans [10].

UNAIDS has indicated that the global ART expansion has increased the demand for viral load monitoring. In 2018, 23.3 million people were receiving ART, an increase of nearly 200%, compared with 8 million in 2010.

Scale-up of HIV viral load testing during the period of 2013–2018 in eight sub-Saharan African countries reports successful efforts to increase access to viral load monitoring for ART Clients.

Initially, many sub-Saharan African countries were only initiating viral load testing to monitor treatment success. The development to move from using CD4 counts to molecular-based viral load testing as a national strategy required educating health care providers and clients in order to increase the demand for viral load testing, training laboratory personnel in order to improve the quality and efficiency of molecular testing, optimizing the laboratory network, and strengthening clinical services for the effective patient or client management [11].

Global Perspective

It is reported that 36.9 million people were living with HIV, and only 21.7 million were reported to have received anti-retroviral treatment in 2017. 1.8 million people were diagnosed with HIV, and 1 million died from AIDS-related illnesses. (Acquired Immune Deficiency Syndrome) in 2017 [11].

In July 2021, the WHO Fact Sheet reported that about two-thirds of people living with HIV live in Africa, and despite the benefits of

Antiretroviral Therapy [ART], there is a growing concern for clients experiencing treatment failure.

People living with HIV need continuous HIV care and access to anti-retroviral treatment to stay under constant viral load suppression in order to improve their immune system; reduce the risk of drug resistance and HIV-related disease as well.

Regional Perspective

In 2019 [12] conducted, a study to evaluate the progress of HIV testing, the researchers examined expansion and activities in eight countries in sub-Saharan Africa [Côte d'Ivoire, Kenya, Lesotho, Malawi, Namibia, South Africa, Tanzania, and Uganda.] during 2013–2018. Data from a preliminary annual progress report for viral load testing in all countries except Lesotho were published in 2015 and 2016. The selection of countries in this report was based on data availability and agreement with the respective ministries of health. Data was collected for each calendar year.

Testing for viral load 6 months after initiation of ART, followed by testing at 12 months and every year thereafter, was prescribed by national guidelines.

Health department officials and CDC program officials collected data from an electronic laboratory system on accumulated clients in ART treatment and also noted the number of ART clients with at least one viral load test result, viral load suppression [defined as less than 1,000 copies of HIV RNA in a sample], and the median transition time from sample collection to the time the sample results are released and received.

Avert figures for 2019 reported that as of early 2019, South Africa showed the largest number of clients receiving ART treatment at 4.57 million among all the countries surveyed; representing about 59% of South Africans living with HIV based on UNAIDS data.

From 2013 to 2018, the number of people receiving anti-retroviral drugs increased by 78% in all eight countries, from 5,190,275 before rising to 9,240,111 in 2018, thus increasing the need for viral load testing.

During this period, the average time it took from sample collection to release of test results was reduced in Kenya to 55.6%, Lesotho to 50%, and Uganda to 22.2%.

In contrast, the transition period increased in Côte d'Ivoire, Namibia, South Africa, and Tanzania, and the transition period in Malawi has not changed [12].

In 2013–2018, the proportion of ART patients with at least one result of a viral load test increased in Côte d'Ivoire [from 3.8% to 74.1%], Kenya [from 8.4% to 85.8% %], Lesotho [from 4.9% to 51.9%], and Malawi [from 6% to 51.3%], Namibia [from 60.5% to 99.9%], and Uganda [from 4.9% to 89%. South Africa and Tanzania were excluded from the analysis because the 2018 data were only available from January to June.

The viral load rate was ≥80% before the scale-up strategy in only three of the eight countries: Uganda [90%], Malawi [86%], and Tanzania [80%].

At the end of 2018, all countries except Côte d'Ivoire reported viral load suppression of less than or equal to 85%. The highest viral suppression of 94.4% has been reported by Namibia. The largest increase in viral load from 2013 to 2018 occurred in Kenya [40%], followed by Namibia [28%] and Lesotho [24%]; Vl suppression rates rose by <20% in Côte d'Ivoire, South Africa, and Tanzania. The viral load has not changed in Malawi, and in Uganda, the rate has dropped by 2.4%, while the number of viral load tests is increasing [12].

Between 1 October and 15 November 2019, a cross-sectional survey was conducted among 15-49-year-old pregnant women attending antenatal care in 1 589 nationally representative public health facilities in South Africa [13].

Data on anti-retroviral therapy [ART] status, viral load testing, viral load result documentation, and viral suppression were extracted from medical records. Survey-based

logistic regression examined factors associated with coverage of viral load testing. All analyses took into account the survey design.

Of the 8 112 pregnant women who were eligible for a viral load test,905 women were started on antiretroviral drugs during pregnancy and received antiretroviral therapy for at least 3 months, and 7,207 women who started antiretroviral therapy, 81.7% received a viral load test, which is 94.1% of them. The results of the viral load test were recorded in medical records. Among those with the results of a viral load test, 74.1% were infected with the virus. A lower proportion [73.0%] of women who started ART during pregnancy received a viral load test compared to women who started ART before pregnancy [82.8%]. Viral load was low [56.8%] among women who started ART during pregnancy. Viral load was 76.1% in women starting ART before pregnancy. The introduction of ART during pregnancy than before pregnancy was associated with a lower chance of getting a viral load test during pregnancy [altered rate of complications: adjusted odds ratio: 1.6, 95% confidence interval: 1.4-1.8].

Most [81.7%] women received viral load testing, and the results documentation was high [94.1%]. The low viral suppression among pregnant women initiating ART during pregnancy highlights the importance of enhanced adherence counselling and the need to fast-track the roll-out of Dolutegravir to enable the achievement of more rapid viral suppression. The coverage of viral load testing could be improved further by implementing quality improvement initiatives [13].

Local Perspective

In as much as the success of HIV treatment programs is dependent on retention and viral suppression, routine program monitoring of these outcomes may not be complete.

In July 2015 a study was conducted in Zambia [14] that extracted data from the SmartCare electronic system to collect a large representative cohort of patients on treatment in the region. This study traced a sample of clients with unknown status or lost to follow-up to document true care status and Viral load status.

The study selected health facilities from 4 provinces that were defined by facility type and province with probability proportional to size. In each facility, data was collected on adults with at least 1 clinical visit after treatment initiation in the past 24 months.

Lost-to-follow-up clients, i.e. clients late for 90 or more days late for their last appointment, were identified from a selected random sample, and records were reviewed and traced. Clients were contacted through phone calls and personal home visits in the community.

In 1 of 4 provinces, they also collected dried blood spots [DBSs] for plasma HIV RNA testing. They used inverse probability weights to incorporate sampling outcomes into Aalen-Johansen and Cox proportional hazards regression to estimate retention and viremia. They used a bias analysis approach to correct for the known inaccuracy of plasma HIV RNA levels obtained from DBSs. From a total of 64 facilities with 165,464 adults on ART, they selected 32 facilities with 104,966 patients, of whom 17,602 [17%] were lost to follow-up: Those lost to follow-up had median age 36 years, 60% were female [N = 11,241], they had a median enrollment CD4 count of 220 cells/μl, and 38% had WHO stage 1 clinical disease [N = 10,690].

The researchers traced 2,892 [16%] and found updated outcomes for 2,163 [75%]: 412 [19%] had died, 836 [39%] were alive and in care at their original clinic, 457 [21%] had transferred to a new clinic, 255 [12%] were alive and out of care, and 203 [9%] were alive, but we were unable to determine care status. Estimates using data from the EMR only suggested that 42.7% [95% CI 38.0%-47.1%] of new ART starters and 72.3% [95% CI 71.8%-73.0%] of all ART users were retained at 2 years [14].

After incorporating updated data through tracing, it was found that 77.3% [95% CI 70.5%-

84.0%] of new initiates and 91.2% [95% CI 90.5%-91.8%] of all ART users were retained [at the original clinic or transferred], indicating that routine program data underestimated retention in care markedly.

In Lusaka Province, HIV RNA levels greater than or equal to 1,000 copies/ml were present in 18.1% [95% CI 14.0%-22.3%] of patients in care, 71.3% [95% CI 58.2%-84.4%] of lost patients, and 24.7% [95% CI 21.0%-29.3%]. The main study limitations were imperfect response rates and the use of self-reported care status.

It was concluded that in this region of Zambia, routine program data underestimated retention, and the point prevalence of unsuppressed HIV RNA was high when lost patients were accounted for. Viremia was prevalent among patients who unofficially transferred: Sustained engagement remains a challenge among HIV patients in Zambia, and targeted sampling is an effective strategy to identify such gaps in the care cascade and monitor programmatic progress [14].

Conceptual Framework

The conceptual framework for this study is based on a study conducted in rural south-western Uganda 2018 by a group of researchers [15]; that assessed associated factors that may lead to virologic failure.

This analysis was based on a conceptual framework which assumed; that ART adherence was independently associated with virological failure. Other confounders included socio-demographic [age, gender, marital status, occupation and level of education], behavioural [alcohol consumption and a number of sexual partners] and biological [body mass index, baseline CD4 counts and baseline VL] risk factors.

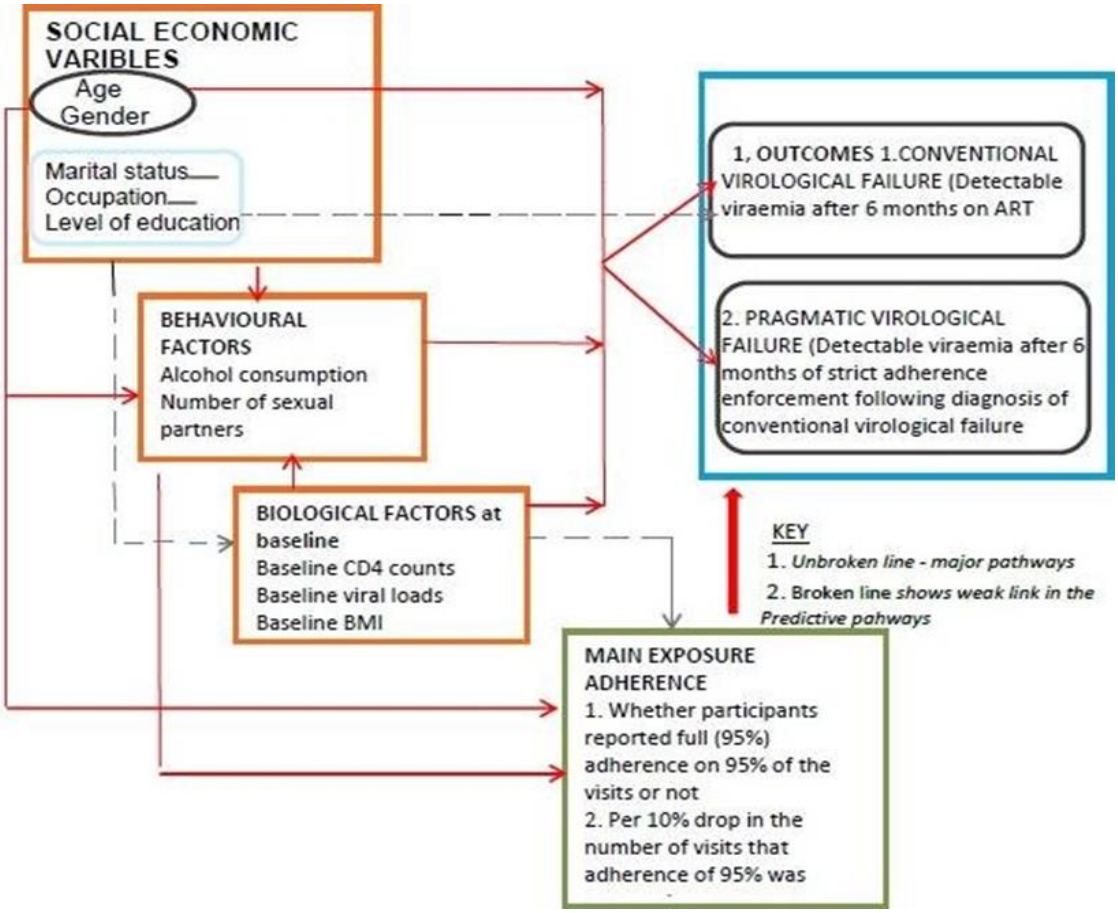

Figure 1. Conceptual Framework for Factors associated with Viral Load Failure [15].

To achieve the 95-955-95 treatment target by 2030, the strategy of rolling out viral load testing should be supplemented with innovative adherence enforcement to achieve sustained viral suppression among patients on ART.

This study suggested that more studies are needed to assess the factors responsible for virological failure, as this will help design strategies to address adherence issues and virological failure in different age groups.

This framework was selected for this study because it touches on most aspects that can enhance understanding of factors associated with viral load suppression and guided myself as a researcher in determining the methodology that informing my programmatic considerations in this study.

Study Objective

To determine viral load suppression amongst people living with HIV on Highly active Anti-retroviral therapy [HAART] at Kaloko ART health facility of Ndola District.

Specific Objectives

1. Determine the prevalence of VL suppression among clients at Chipulukusu, Kaloko and Kantolomba ART clinics in Ndola, Zambia.
2. Assess the association between viral load suppression and gender amongst clients at Chipulukusu, Kaloko and Kantolomba ART clinics in Ndola, Zambia.
3. Assess the relationship between viral load suppression and age amongst clients at Chipulukusu, Kaloko and Kantolomba ART clinics in Ndola, Zambia.

Research Questions

1. What is the level of VL suppression among clients at Chipulukusu, Kaloko and Kantolomba ART clinics in Ndola, Zambia?
2. Is there an association between viral load suppression and gender amongst clients at Chipulukusu, Kaloko and Kantolomba ART clinics in Ndola Zambia?
3. Is there an association between viral load suppression and age amongst clients at Chipulukusu, Kaloko and Kantolomba ART clinics in Ndola Zambia.

Methodology

Study Design and Setting

This study was a retrospective analysis of SmartCare data from 3 anti-retroviral therapy [ART] clinics in the Ndola district; Chipulukusu, Kaloko and Kantolomba. SmartCare is the national electronic health record system used for data capturing, and information on continued care and treatment for clients on ART can be extracted using this system.

In 2004, SmartCare was developed and deployed by the Ministry of Health in 2004 in partnership with the Centers for Disease Control and Prevention [CDC] and many other implementing partners.

Study Population

The targeted population for this study were all PLWHIV on ART for at-least 6 months or more at Chipulukusu, Kaloko and Kantolomba clinics.

Sample Size

The sample size for this study was the total number of PLWHIV registered in the SmartCare system at Chipulukusu, Kaloko and Kantolomba clinics from December 2018 to October 2022.

Data Collection

The data were abstracted from the SmartCare system using a structured tool capturing values on age, gender, duration on treatment, viral load, and adherence to treatment, appointment keeping and ART regimen of each client.

Data Management and Cleaning

The data were abstracted from the SmartCare system into Microsoft Excel 2013®, and exported to SAS® version 9.4 for cleaning and statistical analysis. The data were checked for missing values, out of expected range values, period on ART of less than 6 months, and one viral load test in the past 12 months. Records with missing values or out of expected range values were verified against values in clients'

files. Records with a period on ART of less than 6 months or no viral load test in the past 12 months were excluded from the final dataset for statistical analyses.

Statistical Analyses

The data comprised both continuous and categorical variables. The variables considered as continuous were age, duration on treatment and viral load. The variables considered as categorical were sex and facility.

Age was recorded into programmatically important categories which included the groups 5 to 14, 20 to 34 for Males and 15 to 24 for females. A new variable, suppression status, was defined and recorded. Suppression status 'successful' was defined and recorded as 'Viral load equal to 50 viral copies or less per microliter [ml] after 6 months or more on ART.

Continuous variables were described using means and standard deviations, and medians and range values. Normality of distribution of continuous variables, a prerequisite for use of parametric methods for testing statistical significance of differences in the distributions of continuous variables between groups, was verified using the Shapiro-Wilk's test for normality. Categorical variables were described using frequency and percentage distributions.

Statistical significance of the association between continuous factors and viral load suppression was tested using the parametric two-sample test for difference in the distribution of a continuous variable between being suppressed and non-suppressed with the factor non-normally distributed. The non-parametric Wilcoxon rank-sum test was used to test statistical significance of association between continuous factors and viral load suppression for difference in the distribution of a continuous variable between being suppressed and non-suppressed with the factor non-normally distributed.

Statistical association between categorical factors and viral load suppression was tested using the chi-square, with Yate's correction, test for association between two categorical variables.

Ethical Considerations [Consent, Confidentiality]

The study adhered to ethics as provided for by Texila American University Research and the National Health Research Authority of Zambia. The author sought approval to carry out the study from Texila American University. A letter of authorization was obtained from Texila American University to carry out the study in the selected district and health facilities.

The approval was then presented to Texila University Ethics Committee and the National Health Research Authority for ethical clearance, which was presented to the selected province and district.

Additionally, all information gathered was handled carefully and stored securely to maintain confidentiality. Client data was de-identified with no use of personal data such as names or ART numbers. All information collected will be treated with confidentiality.

Results

The study recruited 795 ART clients registered in the SmartCare database for Chipulukusu, Kaloko and Kantolomba clinics for the period 2018 to October 2022. Descriptive statistics for age, duration of treatment and viral load of the recruited clients are shown in Table 1.

Table 1. Descriptive Statistics for Age, Duration on Treatment and Viral Load

Variable	N	Mean	Standard Deviation	Median	Minimum	Maximum
Age	795	37.56	10.50	37.00	5.00	72.00
Duration in months	795	6.00	0	6.00	6.00	6.00
Last viral load record	795	963.08	10,077.98	0	0	223,300.00

The age of the recruited clients ranged from 5 to 72 years, with a mean of 37.56 years and standard deviation 10.5 years, and median 37 years. Most of the recruited clients had been on ART for a minimum and maximum period of 6 months. Recorded viral load of the recruited clients ranged from 0 to 223,300 copies per ml, with a mean 963.08 and standard deviation 10,077.98, and a median 0.

Descriptive statistics for sex, dispensation, facility and duration on treatment and viral load are shown in Table 2.

Table 2. Descriptive Statistics for Sex, Dispensation, Facility and Viral on Treatment and Viral Load

Variable	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Sex				
Female	513	64.53	513	64.53
Male	282	35.47	795	100.00
Dispensation				
AZT 300 mg BD + 3TC 150 mg BD + LPV/r iii po BD	2	0.25	2	0.25
TDF 300 mg OD + 3TC 150 mg BD + EFV 600 mg OD	4	0.51	6	0.76
TDF 300 mg OD + 3TC 300 mg OD + DTG 50 mg OD	779	99.24	785	100.00
Facility				
Kaloko Urban Health Center	396	49.81	396	49.81
Kantolomba Health Post	299	37.61	695	87.42
Lubuto Urban Health Center	100	12.58	795	100.00
Viral suppression				
Failed	74	9.31	74	9.31
Success	721	90.69	795	90.69

Over two-thirds [64.53%] of the recruited clients were female. Almost all [99.25%] ART dispensations were of TDF 300 mg OD + 3TC 300 mg OD + DTG 50 mg OD. At 49.81% and 12.58%, the majority of the recruited clients were from Kaloko Urban Health Center, and the minority were from Chipulukusu Health Center, respectively. Successful viral load suppression had been achieved in over ninety percent [90.69%] of the recruited clients.

Viral load suppression according to age group, sex, dispensed drug and facility is shown in Figure 2, Figure 3, Figure 4, Figure 5 and Table 3. All the recruited clients in age groups 5 to 14 years and 65 and above years [100.00%, 10/10 and 100.00%, 11/11 respectively] had achieved viral load suppression 6 months after initiation on ART. At 86.31%, the lowest level of viral load suppression was achieved among the recruited clients aged 55 to 59 years old. Viral load suppression in the programmatically important age groups of 15 to 24 years and 20 to 34 was 89.83% [53/59] and 90.43% [274/303], respectively.

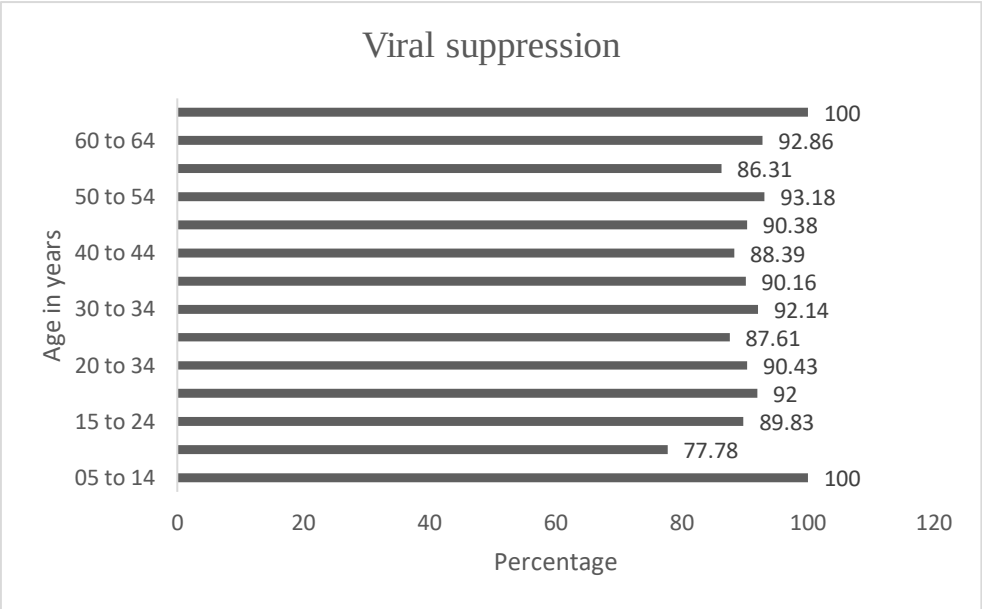

Figure 2. Age-Specific Viral Load Suppression

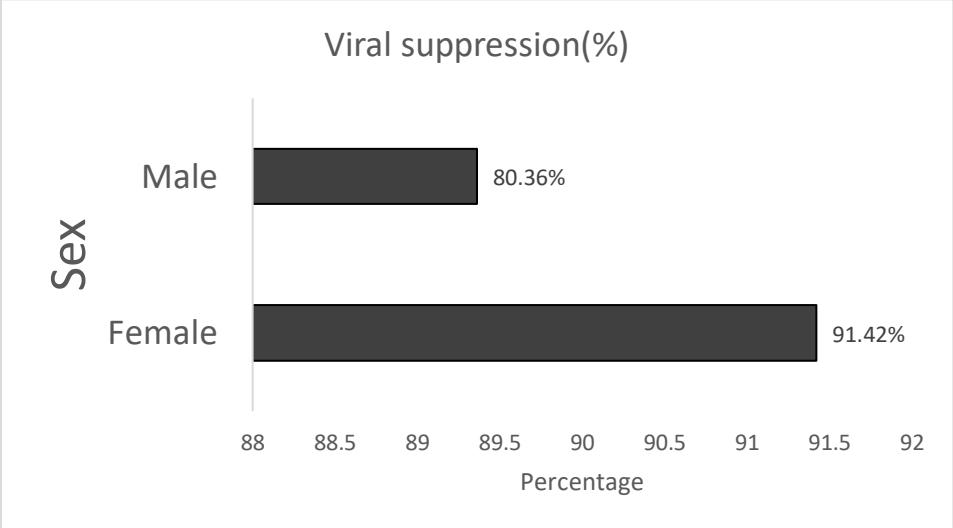

Figure 3. Sex-Specific Viral Load Suppression

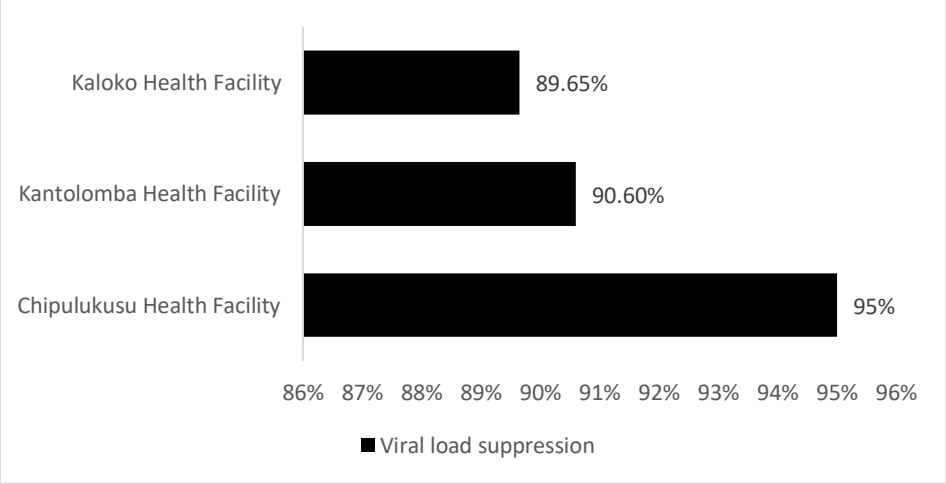

Figure 4: Facility Specific Viral Load Suppression

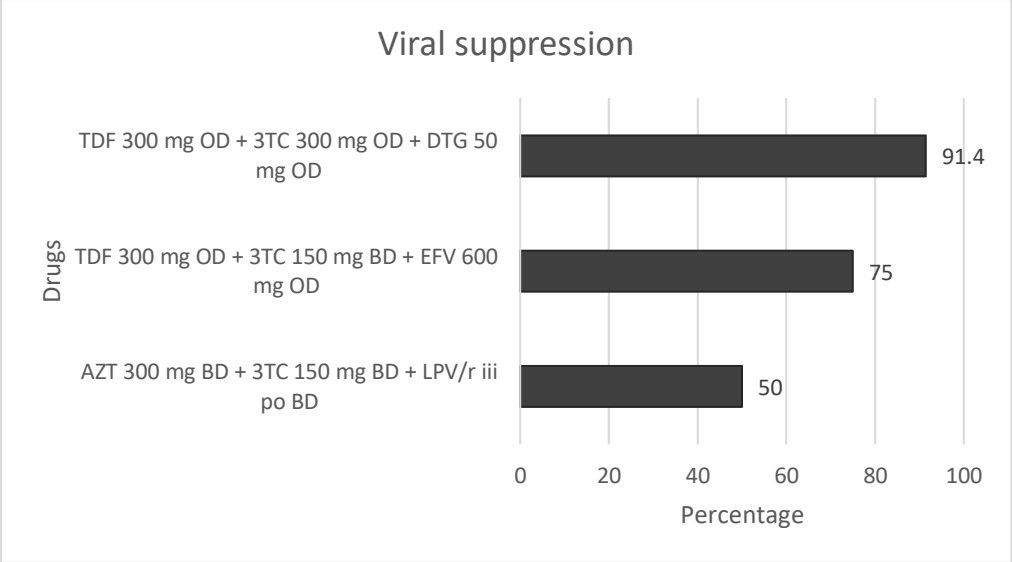

Figure 5. Drugs Specific Viral Load Suppression

Table 3. Viral Load Suppression according to Age Group, Sex Dispensed Drug and Facility

Age group	**Frequency**	**Percent**	**Percent Viral suppression**
05 to 14	10	1.26	100.00
15 to 19	9	1.13	77.78
15 to 24	59	7.42	89.83
20 to 24	50	6.29	92.00
20 to 34	303	38.11	90.43
25 to 29	113	14.21	87.61
30 to 34	140	17.61	92.14
35 to 39	166	20.88	90.16
40 to 44	112	14.09	88.39
45 to 49	97	12.20	90.38
50 to 54	44	5.53	93.18
55 to 59	29	3.65	86.31
60 to 64	14	1.76	92.86
65 and above	11	1.38	100.00
Sex			
Female	513	64.53	91.42
Male	282	35.47	89.36
Facility			
Kaloko Urban Health Center	396	49.81	89.65
Kantolomba Health Post	299	37.61	90.64
Chipulukusu Health Center	100	12.58	95.00
Drug dispensed			
AZT 300 mg BD + 3TC 150 mg BD + LPV/r iii po BD	2	0.25	50.00
TDF 300 mg OD + 3TC 150 mg BD + EFV 600 mg OD	4	0.51	75.00
TDF 300 mg OD + 3TC 300 mg OD + DTG 50 mg OD	779	99.24	91.4

Viral load suppression seemed slightly higher among females [91.42%, 469/513] compared to that of males [86.36%, 252/282]. Among the facilities, viral load suppression seemed highest at Chipulukusu Urban Health Center [95.00%, 95/100] and lowest at Kaloko Urban Health Center [89.65%, 365/396]. Comparing viral load suppression among the dispensed drugs, it seemed highest under TDF 300 mg OD + 3TC 300 mg OD + DTG 50 mg OD drug group [99.24%, 712/779].

The distribution of age in the viral load was not normally distributed in both the non-suppressed group [W = 0.37, p-value <0.0001] and the viral load suppressed group. The non-parametric Wilcoxon-sum test for the difference in the distribution of age between viral load non-suppressed group and the viral load suppressed group was not significant [Z = 28208.50, p-value = 0.5084]. Therefore, Age was not among the statistically significant factors associated with viral load suppression.

Association of sex and facility with viral suppression were also non-statistically significant [chi-square = 0.9003, p-value = 0.3427 and chi-square = 5.5139, p-value = 0.1390 respectively]. The association of dispensation with viral suppression was statistically significant chi-square = 2.1885, p-value = 0.0189]. As such, drug dispensed was the statistically significant factor found to be associated with viral load suppression among the recruited clients and the collected factors from the SmartCare database.

Discussion

The majority [64.53%] of the recruited clients in this study were female. This may mean, on one hand, that females constitute a bigger proportion of PLHIV in populations served by Chipulukusu, Kaloko and Kantolomba ART clinics of Ndola Zambia than males. Such a conclusion would be in line with the national sex-specific prevalences and the region prevalences that pit prevalences in females to be higher than those in males [7, 16, 17]. This, on the other hand, may mean that more HIV-positive females access ART clinics more than their male counterparts. Such a conclusion would be consistent with findings by Ankomah et al [2016] that female clients are more willing and do access ART clinics than males [18]. Either way, measures have to be taken that reduce infections in both females and males, but more in females, and that increase males to be tested and access ART services.

The average and median age in this study were 37.7 and 37.0 years, respectively, suggesting that a relatively young age group of the population is accessing ART. All the ART clients included in this study had been on treatment for a minimum and maximum period of 6 months. As such, ART initiation has been done at a relatively young age which is good because older age at ART initiation has been shown in other studies, such as one by Ssebetride et al 2018 to be associated with a higher risk of mortality compared to younger age [19].

VL suppression was found to be 90.69% overall. The observed viral suppression in this study is comparable to the national level of 89.2% reported in the Zambia Population-based HIV Impact Assessment [ZAMPHIA] [7]. Observed VL suppression seemed higher in females than in males [91.4% vs 89.4%]. This is consistence with the reported sex-specific national levels of 89.7% in HIV-positive females and 88.2% in HIV-positive males. However, these figures fall short of the target 95.00% to 100.00%.

Looking at age specific VL suppression, all the youngest age groups [5 to 14 years] and the old age group of 65 years and above had attained a suppressed VL. This is particularly important and encouraging as these two age groups are assumed to have the weakest immunity and are more vulnerable to anti retral viral resistance [20], morbidities and hence moratlity especially if VL is not suppressed among them. VL suppression levels were found relatively high but still short of the 95% to 100% programmatic target. This is concerning as the age group

constitutes the active population who are very likely to transmit the virus if the VL is not suppressed.

Many challenges comprise the factors that hinder the achievement of a 95% to 100% VL suppression. As shown in other studies, among the factors that are associated with VL suppression are not knowing HIV status, gender, time on ART, baseline CD4 T cell count, WHO stage, ART regimen, adherence, and TB co-infection [8]. Others are young age, low hemoglobin, history of lost to follow-up and educational status, and treatment regimen [8,9]. This study only considered age, sex, facility, and treatment reagimen. Only treatment reagimen was found significantly associated with VL suppression. The analysis had been restricted to ART clients who had been on HAART for not less and not more than 6 months. This may have controlled the effects of the other factors as their variations may not have been so much due to the short time period of exposure to HAART.

Conclusion and Recommendations

Conclusions

In Chipulukusu, Kaloko and Kantolomba ART clinics in Ndola Zambia:

1. VL suppression is high but still below target.
2. HIV-positive females access ART clinics more than their male counterparts.
3. Age and sex are not associated with VL suppression.

Recommendations

1. Efforts to increase VL suppression should be expanded.
2. Efforts targeted at increasing access to ART by males should be expanded.
3. Efforts to increase suppression among the highly active age groups should be expanded, and those addressing the vulnerable young and old age groups sustained.

Limitations

This is a retrospective study of secondary data. As such, the data was not designed to specifically address the objectives of the current study, and this may be the reason that age and sex, factors found to be significantly associated with VL suppression in other studies, may not have been found significant in this study. However, the descriptive part was consistent with findings from the other studies. This suggests clinical significance, implying that the seen differences between age groups or gender in VL suppression levels is clinically important, and it is possible that clinical practice can change because of the seen differences despite statistical significance.

Conflict of Interest Statement

I certify that I have no affiliations with or involved in any organization or entity with any financial interest or non- financial interest [such as personal or professional relationships or affiliations] in the materials discussed in this manuscript.

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Assessment of Knowledge and Acceptance of Covid-19 Vaccinations among Healthcare Workers in Kano State, Nigeria

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Abstract

Coronavirus is an ongoing global viral disease firstly identified in Wuhan, China in December 2019, hence its name Covid-19. The World Health Organization (WHO) declared Covid-19 as a pandemic with Public Health Emergency of International Concern (PHEIC). People get infected when they inhale small airborne particles or droplets exhaled by a Covid-19 infected person. Some of the recommended preventive measures include social or physical distancing, covering the mouth when sneezing or coughing, wearing of face masks and regular hand wash. A multi-stage sampling method was used to select the study locations, hospitals, healthcare departments and survey groups. A quantitative method - using structured questionnaires was used. Statistical analysis was conducted using Statistical Package for Social Science (SPSS) version 26. Out of the 1004 participants that were surveyed, 864 responses were retrieved. The bulk of the respondents (59%) were male. Knowledge of Covid–19 was poor, 24.3%, while acceptance of Covid-19 vaccination was high (74.2%). Important predictors of Covid-19 vaccination are the number of years in service, marital status, designated work, and type of medical facility. Knowledge of Covid-19 is low, but acceptance of its vaccination was high among the study population. This could be due to fear of contacting the disease early plus the associated high mortality among the study population. There is a need for an enlightenment campaign to increase knowledge and further improve acceptance of the Covid-19 vaccination.

Keywords*: Acceptance, Covid –19, Knowledge, Vaccination.*

Introduction

Coronavirus is a viral infectious disease affecting the respiratory tract. It has been reported to first started in Wuhan, China, in December 2019, hence the name Covid-19 [1]. The virus spread from Wuhan throughout the globe, affecting millions of people with more than 177 million cases, 3.8 million deaths, and 161 million recovered worldwide, making it one of the deadliest pandemics in history [2]. The infection was declared a pandemic of public health emergency by World Health Organization (WHO) on 30th January 2020, and its official name 'Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2)' was also declared [3].

The first case of Covid-19 in Africa was reported in Egypt on 14th February 2020 [4]. Other African countries have followed suites with so far, all the 55 African Union Member States have been infected. Mortality is not as high as it is in America and Europe. In Europe, there are more than 4,695,132 confirmed cases with about 126,394 deaths [5]. In Nigeria, Covid-19 was first reported on 27th February 2020 by a 44-year-old Italian [6]. The index case ultimately results in the spread of the virus

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in Nigeria. Despite vigorous community transmission, decaying health sector, and lack of preparedness for public health emergencies, the country still recorded a relatively small number of cases, with about 167,095 confirmed cases, 2,117 deaths, and 163,483 recovered as of 16th June 2021 [7].

A vaccine is a biochemical agent that stimulates the body's natural defence mechanism against infectious agents when introduced to the body. Thus, any attempt towards the development of a safe and effective Covid-19 vaccine is a public health necessity with a global concern [8]. Finding a safe and effective vaccine against Covid-19 will create a serious breakthrough in the fight against the pandemic. Scientists all over the world are working tirelessly on this, with some level of success recorded. Covid-19 vaccines are already available since 18th February 2021 all over the world, and the vaccine is now targeted at vulnerable population (elderly people) and prioritize those at the highest risk (healthcare workers) [9]. At least seven different vaccines under three different platforms have been rolled out, with more than 200 types on the way. The Covid-19 Vaccines Global Access Facility (COVAX) is one of the three major backbones of the access to COVID-19 Tools (ACT) accelerator, launched in April 2021 by the WHO, the European Commission and France as a response to the ongoing Covid-19 pandemic [10]. Covax was aimed at clearing the acute phase of the infection by speeding up the process of development and distribution of safe and effective vaccines against Covid-19 in addition to supporting the building of manufacturing capabilities and work with government and manufacturers to ensure fair and equitable allocation of the vaccines globally [11]. There is no doubt that vaccines are one of the effective preventive tools against Covid-19, although several other preventive measures including social or physical distancing, covering the mouth when sneezing or coughing, wearing face masks, hand washing regularly among others have been recommended by the WHO. Millions of doses of the Covid-19 vaccine are being produced and distributed globally. Africa and Nigeria, in particular, is not left out. On the 2nd of March 2021, Nigeria received nearly 4million doses of Covid-19 vaccines, shipped via the Covax facility, a partnership between CEPI, Gavi, UNICEF and WHO [11]. Both the frontline healthcare workers and the elderly ones have started receiving the first dose, and a few have received the second dose of the vaccine, though with a lot of myths and misconceptions about its integrity. Such healthcare workers' misconception about the Covid-19 vaccine might be discouraging others from accepting the vaccination, which will have serious implications in containing the pandemic. It is, therefore, essential to conducting an exploratory study to assess the knowledge and acceptance of Covid-19 vaccination among frontline healthcare workers in Kano State, Nigeria. Part of the aims of this study is to identify the causes of misconceptions therein and inform relevant policymakers to take appropriate action.

Methodology

This section presents the methodology that was employed in this study. The following aspects of the research were briefly presented (and will be reported in detail later): research study location; research philosophy and paradigm; research planning and implementation; research design and methods of data collection; research strategy and sampling methods; method of data analysis. The adopted methodology is quantitative.

The research was conducted in Kano State, in the Federal Republic of Nigeria. Kano State is one of the 36 States in Nigeria and was created on 27th May 1967 from the part of the then northern region. Kano State borders Katsina State to the northwest, Kaduna State to the southwest, Bauchi State to the southeast and Jigawa State (which was initially part of Kano

State until 1991) to the northeast. The historic and ancient city of Kano is the capital of Kano State. Kano State is for long been known as the centre of commerce since during trans-Sahara trade and is the most industrialized State in northern Nigeria and the second-largest commercial centre nationwide. Agricultural activities at both subsistence and commercial capacities and during the rainy and dry (irrigation) seasons are being practised in the State. The official language, like in other parts of the country, is English, although Hausa and Fulani are the predominant tribes in the State.

Kano State has a total landmass of 20,760 km^2, 44 Local Government Areas and 484 wards. The state is also enriched with numerous healthcare institutions, including three Teaching hospitals, namely: Aminu Kano Teaching Hospital, Muhammad Abdullahi Wase Teaching Hospital and Yusuf Maitama Sule University Teaching Hospital. Kano State, like other States in Nigeria, has had a history of epidemics and pandemics diseases, including Influenza, Yellow fever, and Lassa fever, and presently experiencing the Covid-19 outbreak like the rest parts of the world [12]. Industrialization and urbanization have posed unique challenges to the waste management in Kano city, and these, among other reasons, resulted in water, air, and soil pollution [13]. Kano State, like other parts of Nigeria, has a poor healthcare system with a poor average life expectancy of 47 years [14].

Respondents were given either a web-based or paper-based validated and refined structured questionnaire. The questions were developed using simple and unambiguous statements or terms for easy understanding. The questionnaires were refined to facilitate a better understanding before the survey was shared among the respondents. The developed questionnaires were distributed to 1004 randomly selected healthcare workers of the randomly selected hospitals of the randomly selected LGAs. The survey instrument comprises of 60 questions and requires about 15 minutes to participate. The questions were divided into 4 parts, 15 questions each. The first part contained the introductory aspects, including the title of the study, the aim of the study and options for respondents to indicate their consent to participate in the survey and demographic questions. The remaining parts were made to assess the healthcare workers' knowledge and acceptance or readiness to participate in the Covid-19 vaccination exercise.

A multi-stage sampling method was used to select the study subjects. One (1) Local Government Area (LGA) was selected each from the three senatorial zones (Kano Central, Kano North and Kano South) of Kano State, making a total of three (3) LGAs. The selection of the LGA was conducted randomly from the list of 15, 13 and 16LGAs of Kano Central, Kano North and Kano South senatorial zones, respectively. The list of hospitals from the 3 selected local governments served as the sampling frame for the second stage. Two (2) hospitals were selected randomly from each of the LGA by drawing lots; the list of hospitals in each of the LGA was written separately on small pieces of paper, then folded and mixed up on a table, a random selection was then made. Depending on the population of each of the selected LGAs and hospitals, sampling was done proportionately. In addition, three (3) tertiary health centres in Kano city (Aminu Kano Teaching Hospital, Murtala Mohammed Specialist Hospital and Muhammad Abdullahi Wase Teaching Hospital) were also selected, totalling 3 x 2 + 3 = 9 hospitals. Another multi-stage sampling technique was done where all the health departments or units were listed, and a random selection was made to identify the survey groups. The identified departments or units in such health centres were surveyed.

Only frontline healthcare workers that consent to participate in the study and work in the selected hospitals and departments were allowed to participate in the survey. These include doctors, nurses, midwives, pharmacists,

laboratory technicians and attendants and record officers. While healthcare workers that refused to consent to participate in the study even if they were working in the selected hospitals and departments were excluded, administrative staff were also excluded from the study.

The validity and reliability of the study depend largely on the nature of the research problem at hand, the general methodology and the nature of the data that was collected [15]. Some of the validity and reliability strategy that were used in this study include.

1. A quantitative method using structured questionnaires was used.
2. To further test the validity and reliability of research instruments, a pilot study was also conducted to refine the questionnaire so that respondents will have no problems in answering the questions and the researcher would have no problems in recording the data.

Results

A total of 1,004 participants were surveyed, 864 healthcare workers responded accordingly, putting the response rate at 86.4%. The majority of the respondents were male, 510 (59%) and the age group of 18 – 25 years account for the highest, 308, 35.6%. Most of the respondents have 1 – 5 years in service, 423 (49.0%).

Fourty-seven (5.4%) of the respondents have a postgraduate degree, and there were 57 (6.6%) medical doctors and nurses, and midwives were 275 (31.8%), there were more respondents from the secondary healthcare facilities, which amounted to 438 (50.7%), and the majority of them were adherents of the Islamic religion 829 (95.9%). Further details are found in Table 1.

Table 1. Demographic Characteristics of the Respondents

Variable	Frequency (N)	Percent (%)
Gender		
Male	510	59.00
Female	354	41.00
Age group (years)		
18-25	308	35.6
26-35	280	32.4
36-45	175	20.3
46-55	82	9.5
>55	19	2.2
Number of years in service		
1-5	423	49.0
6-10	153	17.7
11-15	122	14.1
16-20	89	10.3
>20	76	8.8
Marital status		
Single	370	42.8
Married	466	53.9
Divorced/separated	18	2.1
Widow	9	1.0
Number of children		
0	389	45.1

1-3	241	27.9
4-6	138	16.0
7-9	61	7.1
>9	34	3.9
Level of education		
Certificate	103	11,9
Diploma	461	53.4
Higher diploma	92	10.6
Bachelor's degree	161	18.6
Postgraduate	47	5.4
Designated work		
Medical doctor	57	6.6
Pharmacist	87	10.1
Radiographer	37	4.3
Medical laboratory scientist	9	1.0
Nurse and midwife	275	31.8
Medical laboratory technician	85	9.8
Community health practitioner	7	0.8
Community health extension worker	112	13.0
Community health officer	15	1.7
Public health	3	0.3
Environmental health officer	20	2.3
Environmental health technician	10	1.2
Health educator	10	1.2
Junior community health extension worker	6	0.7
Physiotherapist	8	0.9
Medical record officer	13	1.5
Dental technologist	9	1.0
Dental surgery technician	7	8
X-ray technician	7	0.8
Nutrition and dietetic officer	4	0.5
Others	83	9.6
Type of medical facility		
Primary healthcare	222	25.7
Secondary healthcare	438	50.7
Tertiary healthcare	204	23.6
Religion		
Christianity	25	2.9
Islam	829	95.9
Others	10	1.2
Total for each variable	864	100%

Source: Field data

Table 1 shows a demographic characteristic of the respondents, and male respondents were 510 (56%) while female 354 (41%). The age group, 18-25 years, accounted for the highest

308 (35.6%), followed by 26 – 35years, which were 280 (32.4%). The majority of the respondents, 423 (49%), have 1 – 5years in service.

Table 2. Association between Socio-demographic Data and the Knowledge of Covid-19 Infection among Healthcare Workers in Kano State

Variables	Knowledge of Covid-19		p-value
	Good knowledge, n (%)	Poor knowledge, n (%)	
Gender			
Male	122 (14.1)	387 (44.8)	.764
Female	88 (10.2)	266 (30.8)	
Age group (years)			
18-25	74 (8.6)	234 (27.1)	.676
26-35	72 (8.3)	208 (24.1)	
36-45	38 (4.4)	137 (15.9)	
46-55	23 (2.7)	59 (6.8)	
>55	3 (0.3)	16 (1.9)	
Number of years in service			
1-5	113 (13.1)	310 (35.9)	.308
6-10	31 (3.6)	122 (14.1)	
11-15	23 (2.7)	99 (11.5)	
16-20	23 (2.7)	66 (7.6)	
>20	19 (2.2)	57 (6.6)	
Marital status			
Single	92 (10.6)	278 (32.2)	.849
Married	112 (13.0)	354 (41.0)	
Divorced/separated	3 (0.3)	15 (1.7)	
Widow	3 (0.3)	6 (0.7)	
Number of children			
0	95 (11.0)	294 (34.1)	.455
1-3	67 (7.8)	174 (20.2)	
4-6	30 (3.5)	108 (12.5)	
7-9	11 (1.5)	50 (5.8)	
>9	7 (0.8)	27 (3.1)	
Level of education			
Certificate	22 (2.5)	81 (9.4)	.322
Diploma	104 (12.0)	357 (41.3)	
Higher diploma	22 (2.5)	70 (8.1)	
Bachelor’s degree	48 (5.6)	113 (13.1)	
Postgraduate	14 (1.6)	33 (3.8)	
Designated work			
Medical doctor	18 (2.1)	39 (4.5)	.627
Pharmacist	19 (2.2)	68 (7.9)	
Radiographer	9 (1.0)	28 (3.2)	
Medical laboratory scientist	2 (0.2)	7 (0.8)	
Nurse and midwife	71 (8.2)	204 (23.6)	

Medical laboratory technician	23 (2.7)	62 (7.2)	
Community health practitioner	3 (0.3)	4 (0.5)	
Community health extension worker	27 (3.1)	85 (9.8)	
Community health officer	3 (0.3)	12 (1.4)	
Public health	2 (0.2)	1 (0.1)	
Environmental health officer	3 (0.3)	17 (2.0)	
Environmental health technician	1 (0.1)	9 (1.0)	
Health educator	3 (0.3)	7 (0.8)	
Junior community health extension worker	1 (0.1)	5 (0.6)	
Physiotherapist	0 (0.0)	8 (0.9)	
Medical record officer	2 (0.2)	11 (1.3)	
Dental technologist	1 (0.1)	8 (0.9)	
Dental surgery technician	1 (0.1)	6 (0.7)	
X-ray technician	0 (0.0)	7 (0.8)	
Nutrition and dietetic officer	0 (0.0)	4 (0.5)	
Others	21 (2.4)	62 (7.2)	
Type of medical facility			
Primary healthcare	47 (5.4)	175 (20.3)	.163
Secondary healthcare	104 (12.0)	334 (38.7)	
Tertiary healthcare	59 (6.8)	145 (16.8)	
Religion			
Christianity	6 (0.7)	627 (72.6)	.949
Islam	202 (23.4)	19 (2.2)	
Others	2 (0.2)	8 (0.9)	

Source: Field data

Table 2 above shows the association between socio-demographic characteristics of respondents and knowledge of Covid -19 infections among the health care workers in Kano state. Knowledge of the infection appears to be generally low; of the 864 respondents surveyed, only 122 (14.1%) males have good knowledge of Covid -19 infection, while the knowledge is good in only 88 (10.2%) of the female respondents. Knowledge is poor in 387 (44.8%) and 266 (30.8%) of the male and female respondents, respectively. There is no statistically significant association between socio-demographic characteristics of respondents and knowledge of Covid-19 infection.

Table 3. Association between Socio-demographic Data and Level of the Acceptance of Covid-19 Vaccination among Healthcare Workers in Kano State

Variables	**Have you received the Covid-19 vaccine?**		**p-value**
	Yes, n (%)	**No, n (%)**	
Gender			
Male	389 (45.2)	120 (13.9)	.061
Female	249 (28.9)	103 (12.0)	
Age group (years)			
18-25	209 (24.2)	97 (11.3)	.069
26-35	215 (24.9)	65 (7.5)	

36-45	137 (15.9)	38 (4.4)	
46-55	64 (7.4)	18 (2.1)	
>55	14 (1.6)	5 (0.6)	
Number of years in service			
1-5	292 (33.9)	129 (15.0)	.028*
6-10	121 (14.1)	32 (3.7)	
11-15	99 (11.5)	23 (2.7)	
16-20	69 (8.0)	20 (2.3)	
>20	58 (6.7)	18 (2.1)	
Marital status			
Single	256 (29.7)	114 (13.2)	.024*
Married	358 (41.5)	106 (12.3)	
Divorced/separated	17 (2.0)	1 (0.1)	
Widow	7 (0.8)	2 (0.2)	
Number of children			
0	272 (31.6)	117 (13.6)	.053
1-3	178 (20.7)	61 (7.1)	
4-6	109 (12.7)	29 (3.4)	
7-9	51 (5.9)	10 (1.2)	
>9	28 (3.3)	6 (0.7)	
Level of education			
Certificate	81 (9.4)	22 (2.6)	.400
Diploma	341 (39.6)	118 (13.7)	
Higher diploma	72 (8.4)	20 (2.3)	
Bachelor's degree	112 (13.0)	49 (5.7)	
Postgraduate	33 (3.8)	14 (1.6)	
Designated work			
Medical doctor	33 (3.8)	24 (2.8)	.022*
Pharmacist	61 (7.1)	26 (3.0)	
Radiographer	27 (3.1)	10 (1.2)	
Medical laboratory scientist	5 (0.6)	5 (0.5)	
Nurse and midwife	188 (21.8)	85 (9.9)	
Medical laboratory technician	65 (7.5)	20 (2.3)	
Community health practitioner	5 (0.6)	2 (0.2)	
Community health extension worker	92 (10.7)	20 (2.3)	
Community health officer	12 (1.4)	3 (0.3)	
Public health	2 (0.2)	1 (0.1)	
Environmental health officer	19 (2.2)	1 (0.1)	
Environmental health technician	9 (0.1)	1 (0.1)	
Health educator	9 (0.1)	1 (0.1)	
Junior community health extension worker	4 (0.5)	2 (0.2)	
Physiotherapist	8 (0.9)	0 (0.0)	
Medical record officer	9 (1.0)	4 (0.5)	
Dental technologist	8 (0.9)	1 (0.1)	

Dental surgery technician	6 (0.7)	1 (0.1)	
X-ray technician	7 (0.8)	0 (0.0)	
Nutrition and dietetic officer	3 (0.3)	1 (0.1)	
Others	67 (7.8)	16 (1.9)	
Type of medical facility			
Primary healthcare	181 (21.0)	41 (4.8)	.001*
Secondary healthcare	337 (39.1)	101 (11.7)	
Tertiary healthcare	121 (14.0)	81 (9.4)	
Religion			
Christianity	16 (1.9)	9 (1.0)	.463
Islam	615 (71.3)	212 (24.6)	
Others	8 (0.9)	2 (0.2)	

*Statistical significance, p <0.05

Source: Field data

The acceptance level for Covid-19 vaccinations is good as 389 (45.2%), and 249 (28.9%) male and female have received the vaccination respectively. The remaining 120 (13.9%) and 103 (12%) male and female are yet to receive their vaccination, respectively. Statistically, a significant association exists between years in service, marital status, designated work, type of medical facility, and acceptance of Covid-19 vaccinations. See Table 3.

Table 4. Independent Predictors of Knowledge of Covid-19 Infection among Healthcare Workers in Kano State

Variables	**B**	**aOR**	**95% CI**	**p-value**
Gender	-0.41	0.960	0.664, 1.389	.764
Age group (years)	-0.586	0.557	0.110, 2.804	.676
Number of years in service	-0.086	0.918	0.388, 2.172	.308
Marital status	0.640	1.897	0.350, 10.268	.849
Number of children	-0.190	0.827	0.255, 2.676	.455
Level of education	0.606	1.832	0.767, 4.379	.322
Designated work	-0.113	0.893	0.398, 2.004	.627
Type of medical facility	0.288	1.333	0.797, 2.230	.163
Religion	0.088	1.092	0.202, 5.889	.949

Dependent variable: Knowledge of Covid-19 infection; aOR=adjusted odd ratios; CI= confidence interval; *p<0.05

On the predictors of knowledge of Covid-19 infections among health care workers, there is no statistically significant association between knowledge of Covid-19 infections and gender, age groups, marital status, number of years in service, etc. See Table 4.

Table 5. Independent Predictors of the Level of the Acceptance of Covid-19 Vaccination among Healthcare Workers in Kano State

Variables	**B**	**aOR**	**95% CI**	**p-value**
Gender	-0.088	0.916	0.637, 1.317	.061
Age group (years)	-0.111	0.895	0.195, 4.115	.069
Number of years in service	-0.114	1.121	0.462, 2.717	.028*
Marital status	-19.179	0.000	0.000,	.024*

Number of children	0.854	2.349	0.674, 8.191	.053
Level of education	-0.482	0.617	0.254, 1.501	.400
Designated work	0.844	2.325	1.020, 5.298	.022*
Type of medical facility	-0.653	0.521	0.313, 0.867	.001*
Religion	-0.0502	0.605	0.107, 3.432	.463

Dependent variable: Level of the acceptance of Covid-19 vaccination; aOR=adjusted odd ratios; CI= confidence interval; *p<0.05

Independent predictors of the level of acceptance of Covid-19 vaccinations among healthcare workers in Kano State include a number of years in service, marital status, designated work, and type of medical facility. See Table 5.

Discussion

Active health system and the general well-being of the populace rests on the shoulder of knowledgeable health care workers who have expert knowledge and training to contain, treat and aid in the prevention and/or controlling of infectious diseases, especially the newly emerged, deadly Coronavirus disease 2019 (Covid-19). The emergence of this new disease is associated with a lot of disinformation, misinformation and myths that have no scientific evidence. In addition to innovative interventions to contain the dreadful Covid-19 pandemic, it has become necessary to investigate behavioral response to guide context-specific solutions to fast tract achievement of the goal of the public health response. The objective of this study was to assess the knowledge and acceptance of COVID-19 vaccination among healthcare workers in northwestern Nigeria.

The majority of respondents were male, 510 (59.0%), which is comparable to a study conducted in north-central Nigeria, 59.6% [16]. In addition, there were more Muslim respondents in this study than Christians, about 829 (95.9%). This is in tandem with a similar study carried out in Kano, where 93.68% of the participants were Muslims [17]. The Muslim majority may be due to the fact that the State is predominantly inhabited by Muslims. Additionally, there were 57 (6.6%) medical doctors and 275 (31.8%) nurses, which is inconsistent with a study in Egypt which examined 137 (31.2%) medical doctors and 102 (25.1%) nurses [18]. The results of a similar study conducted in Bangladesh showed that the majority of respondents had more than five years of service [19]. This is in line with the finding of the present study 440 (51%).

Of the respondents surveyed in this study, 210 (24.3%) demonstrated good knowledge of COVID-19, almost similar to that of a study conducted among the state-wide population of Kano, which reported that 270 (30.47%) had good knowledge of Covid-19 [17]. Surprisingly, the level of knowledge in this research is far below the level of knowledge reported in South Ethiopia and Uganda, were 74.9% and 69% had good knowledge of Covid-19 infection, respectively [20, 21]. In another study to assess public knowledge, attitudes and practices regarding Covid-19 in Malaysia [22], respondents' knowledge of Covid-19 infection was also rated good (77.2%). The finding of this study is contrary to that of a study conducted to assess knowledge and perceptions of Covid-19 among the general public in the United States and the United Kingdom, where knowledge (especially of the mode of transmission and symptoms) of Covid-19 infection is high, but the study highlighted several misconceptions on how to prevent acquisition of Covid-19 infection including believing in the falsehood that has circulated the social media, [23]. The cut-off points used in the categorization of knowledge may differ from study to study, possibly reflecting the observed differences. Similarly, the level of severity of the pandemic is not the same in all

countries; this could have been responsible for the gap in knowledge of the infection. Despite the huge population of Kano, the perceived seriousness of the disease coupled with communication for development activities has not gained traction among state residents. This could prompt healthcare workers to refresh their knowledge of Covid-19 vaccines.

This poor knowledge can be attributed to the fact that most of the respondents are not directly involved in patient care and have attained only a diploma level of education 461 (53.4%). Similarly, most respondents work in secondary healthcare facilities, 438 (50.7%) and primary healthcare facilities, 222 (25.7%) where workers are less informed. As a result, tertiary health care institutions, with supposedly better equipment, in addition to highly qualified clinicians, serve as reference centres for Covid-19 management. They would likely have greater knowledge about Covid-19 infection and vaccines.

There is no correlation between the socio-demographic characteristics of the respondents with their knowledge of Covid-19 infection in this study. In contrast, working in a comprehensive specialized hospital, having a master's degree, and prior training on Covid-19 infection was found to be strongly associated with the knowledge of health care workers in a study conducted in Ethiopia [20].

Nevertheless, this study found a statistically significant association between knowledge of Covid-19 and the level of acceptance of its vaccines. This demonstrates that good knowledge of Covid-19 disease leads to a better perception of the vaccines and increased willingness and acceptance.

While knowledge of Covid-19 is essential for taking its vaccination, and despite the respondents' poor knowledge of Covid-19, there is a high level of acceptance of its vaccine as the majority, 641 (74.2%), have already taken the vaccine. This is likely because health care workers are more likely to be infected with Covid-19 and therefore need protection from this infection. Moreover, it is easily accessible to them because their vaccination has been prioritized by the National Agency for the Development of Primary Healthcare, the agency responsible for the distribution of vaccines.

It is worthy of noting too, that in Nigeria, taking the vaccine is mandatory for frontline healthcare workers and some other civil servants. Consequently, the acceptance of the Covid-19 vaccination has become significantly high among healthcare workers. Similar strategies could favour acceptance by the general public and will aid in concretizing their advocacy for the vaccination since in another study, respondents were willing to take the vaccines if the campaigns were led by healthcare workers [16].

The reasons for the reluctance/hesitancy to receive the Covid-19 vaccine among these healthcare workers are majorly, religious/personal beliefs (24.9%), lack of information and awareness (38.0%), accessibility and cost-related factors (5.7%), side effects and pain related to injection (31.4%). This underscores the need for more information and awareness about Covid-19 and its vaccination.

The Covid-19 vaccine hesitancy among the public in a study in Nigeria was found to be high as only 36% were willing to take the vaccine [24]. Similar results were reported among medical science students in northwestern Nigeria, including Kano, where only 40% were willing to take the vaccine [25]. In an internet-based cross-sectional survey that was conducted in Egypt, willingness to accept Covid-19 vaccination was 26%, hesitancy was 41.9%, and vaccination refusal was 32.1% [26]. Willingness to accept Covid-19 vaccination was far less than the finding of this particular study in which 74.2% of the respondents have already been vaccinated arguably, willingness is what was reported in this survey which is unlikely to be exact with real acceptance of Covid-19 vaccination, this means that the

number of people that will ultimately accept the vaccines will be lower than 26%. Acceptance of Covid-19 vaccinations was higher (96%) in a study conducted in Malaysia [27]. Essential factors influencing vaccination decisions were vaccine convenience and doctor's recommendation; respondents' age less than 24yrs, Malay race, living in urban areas, tertiary education, single marital status, students, and family income were significantly associated with acceptance of Covid-19 vaccination. The higher acceptance level couple with some of the predictors of acceptance of Covid -19 vaccination is similar to the finding of this study. In a global survey to assess perceived Covid-19 vaccine effectiveness, acceptance, and drivers of vaccination decision-making among the general adult population across 20 different countries [28]; it was gathered that acceptance of Covid-19 vaccination is highest in Malaysia, Bangladesh, and Iraq, 96.0%, 93.6% and 91.8% respectively, a little higher than a report from other countries including Nigeria where this study was conducted. The high level of Covid 19 vaccine acceptance in this study which was conducted among frontline health care workers, implies that the general population will equally accept the same, as it was reported that doctors' recommendation is a strong factor for accepting the vaccination in Malaysia, Philippine, and Indonesia [28]. Thus, the utilization of healthcare workers in creating awareness/sensitization and carrying out the vaccination cannot be understated. Resultantly, the more people take the vaccine the more the propensity to achieve herd immunity against Covid-19. In a national cross-sectional survey conducted in 31 provinces in Mainland China, the vaccination acceptance rate is 89.4%, [29] a little higher than the finding of this study. Important predictors of vaccinations were lack of religious affiliations, having the same occupational status as a result of the coronavirus epidemic, being a non-smoker, always engaging in physical activity, having a lower social status, perceiving Covid-19 to be easily curable and having easier access to vaccination which is contrary to the finding of this study. In another study conducted in Austria, [30] willingness to accept Covid-19 vaccines was (55%) less than the finding of this study, where 74.2% of the study population had already been vaccinated. This could be because the study populations in the index study are frontline healthcare workers whose vaccinations fall among the priority group. In a similar study conducted in Germany, the vaccination acceptance rate was 91.7%, [31] higher than the finding of this study.

Even though, findings from this study indicate that 74.2% of the respondents tested negative for Covid-19 infection, 60.2% were willing to take the vaccine even if they had to pay to take it. In the same vein, 70.7% were willing to take the vaccine even if it is not compulsory for healthcare workers. Likewise, 80.9% of them have received vaccination aside from routine childhood vaccinations. Perhaps the high willingness may be as a result of the conference, seminar, or training program on vaccination that 64.9% of them have attended in the last two years. From the data set, personal decisions (35.8%) and government (32.5%) were influential in the acceptance of the vaccine by the study respondents. And a large percentage (76.3%) of the respondents have recommended and advocated for Covid-19 vaccination in their workplaces or homes.

Furthermore, there is a statistical association between the level of the acceptance of Covid-19 vaccination and the number of years in service, marital status, designated work, and the type of medical facility. This finding is contrary to the finding of a study conducted in Nigeria, where it was reported that a significant association exist between vaccine acceptance or uptake and gender, tribe/ethnicity, religion, and place of residence [33]. On the other hand, a study revealed that increasing age, the influence of heads of the institution, trust in the government, and readiness to pay for the vaccine were associated with acceptance of the Covid-19

vaccine among health science students [25]. The finding of this study is similar to that of a descriptive cross-sectional survey that was also conducted among healthcare workers in Ghana, where important predictors of Covid-19 vaccination acceptance include sex, category of healthcare workers, relative being diagnosed with Covid-19, and trust in the accuracy of measures taken by the government [34]. In an online cross-sectional survey conducted in the Kingdom of Saudi Arabia, factors associated with acceptance of Covid-19 vaccination were a source of health information about Covid 19, perceptions of whether the vaccine is effective on other variants of the virus, previous uptake of the influenza vaccine and potential mandatory of vaccination in order to travel internationally [35]. This is contrary to the finding of this study; as outlined earlier, these predictors or factors affecting uptake of Covid-19 vaccinations differs among countries due to so many reasons, for example, it is compulsory for all intending pilgrimage to ensure they take the Covid-19 vaccine before arriving in Saudi Arabia.

Strength and Limitations

The main strength of this study is that the knowledge and level of acceptance of Covid-19 vaccines have been adequately explored, resulting in important recommendations for other researchers and policymakers.

The major limitations are as follows:

First, it was a cross-sectional study and thus does not establish the cause(s). Second, the study was carried out in Kano, although the country's most populated state, and the results cannot be used for generalization. Third, there were no identification tools for respondents on the survey questionnaire, so health care workers might have given multiple or false submissions. Lastly, it was initially a web-based survey, but due to poor participation, printouts were later introduced, which was costlier and time-consuming.

Conclusion

Healthcare workers in Kano have poor knowledge of Covid-19 infection (24.3%), but the vaccination rate was high (74.2%). The relation between knowledge and acceptance of Covid 19 vaccination is inverse in this study; normally, one will expect the poor knowledge to translate to a poor vaccination rate, but this is not so probably due to fear of contacting the new infection early and its resultant consequences. Similarly, there is no statistically significant association between respondents' socio-demography and knowledge of Covid–19 infections. Respondents' years of service, marital status, designated work, and type of medical facility show statistically significant association with acceptance of Covid-19 vaccines.

Conflict of Interest

Author declares that there is no conflict of interest.

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Assessing the Social and Economic Impact of Logistics Management on the Liberian Economy (The National Transit Authority 2015-2018)

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Abstract

Under the able leadership of Her Excellency Madam Sirleaf, the government envisioned that to address the many unemployment in Liberia, it was prudent to decentralize governance and all government services appertaining transportation from the transport ministry to the national transit authority (NTA) to alleviate huge unemployment deficiency with employment. Therefore, affordable public transportation for Liberians was identified as one of the areas for strategic intervention. Significantly, the remodeling of the Monrovia Transit Authority (MTA) into the National Transit Authority (NTA) tries to pursue decentralization to provide affordable, convenient, and reliable mass transit services to citizens throughout the breadth of the country for all citizenries. After over a decade of post-conflict growth and relative peace and stability since the end of the 1989-2003 conflict, Liberia's transport infrastructure and logistics sector have the potential for enormous growth and development. Over the past period, there has been an increasing emphasis on supply chain and logistics management as a medium for firms to achieve competitive advantage in markets (Collins, 2003. P. 8). A large number of examples in the 1990s show how countries have made significant investments to streamline the supply chain to improve customer satisfaction and increase the internal productivity of their economy. In conclusion, this paper fully explores both the framework for and an analysis of such reflections of the civil unrest conflicts in Liberia and assessing the social and economic impact of logistics management of the Liberian economy.

Keywords*: Social, Economic, Impact, Logistic management, The Liberian economy.*

Introduction

Under the able leadership of Her Excellency Madam Sirleaf, the government passed an act of legislation to establish the National Transit Authority (NTA) to alleviate the many challenges faced in the transport sector of the country's economy. Over the past decade of instability in Liberia, there has been increasing emphasis on supply chain and logistics management in government as a vehicle through which developing nations took advantage of the enormous growth and development of the sector.

Today, Liberia is rebuilding its economy after the civil war ended in 2003, after more than fourteen years of violence in Liberia. Although previously rated as a mere concomitant or sub-disciple in operations and marketing management (Kent and Flint. 1997) [1]. The government of Liberia established the National Transit Authority (NTA) in Monrovia through legislative enactment on September 11, 2008, and approval into Law by Her Excellency President Ellen Johnson-Sirleaf on March 24, 2009.[2] In October 2011, with a generous donation by the Government of India of 25 Ashok Leyland Falcon buses, the Government of Liberia officially launched its mass transit services for the people of Liberia. This donation was soon followed by the government's purchase of additional 8 new buses to further augment NTA's capacity to extend access to

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mass transit services for our people. The government is confident that this policy would facilitate the safe movement of people, goods within the border, and its surrounding at an affordable cost. With this, the expansion and enhance our national development plan- to reduce poverty, create more jobs and stimulate domestic trade and commerce. Developing countries now constitute 48% of world trade, up from 33% in 2000, and the number of people living in extreme poverty has been cut in half since 1990 to just under one billion people. Trade has helped increase the number and quality of jobs in developing countries, stimulated economic growth, and driven productivity increases [3]. This research describes the problem, rationale, general and specific objectives, literature review, research questions, and method overview, explaining the research design approaches and design rationale, population, and ethical considerations. The final part of this research contains a summary and conclusion section comprising the main issues discussed. The case has to do with assessing the social and economic impact of logistics management on the Liberian economy by the government.

Research Questions

1. What impact does logistics management has on the Liberian economy?
2. What were the economic outcomes of logistics management precisely the National Transit Authority from 2015 -2018?
3. What are the factors that lead to the impact of logistics management on the economy?
4. Does logistics management significantly affect the post-war recovery of Liberia transport?
5. How does logistics management affect the National Transit Authority?

Literature Review and Method

The review of related literature concepts of logistics, focusing on logistics management's social and economic impact on the Liberian economy (the National Transit Authority 2015-2018) as a case study. Citizens alleviating poverty after the civil wars in Liberia was a vibrant and robust approach through which the NTA was created through the legislatures for the common good of its citizenry.

Transportation

Through a total road system of 10,600km of the road, 657 km are paved. The road network is a holdup for economic development in Liberia. Due to climatic conditions, it is only possible to work on roads for an average of 6 months per year, with a mile of paved highway costing approximately one million USD, even though these challenges over 425 kilometers of roads are in the process of being completed. The Government of Liberia (GOL) and its development partners have committed about US$323 million to transform Liberia's roads and reduce transport costs. Japan focuses on reducing traffic congestion and securing safe transportation in Somalia Drive, which links to Monrovia's Freeport. With the completion of a paved highway running from Monrovia through Ganta to the Guinean border, Liberia's main horticulture areas (Lofa, Bong and Nimba) have been linked up to the ports of Monrovia (Freeport) and Bassa. Travel time between Ganta and Monrovia has thereby been reduced to three hours [4].

Logistics Sector

Since the civil war, the logistics sector has grown steadily, with many companies coming into the country. These companies bump into specific limitations caused by underdeveloped infrastructure and complicated customs procedures. The infrastructure growth has been led by two main actors: the Government of Liberia and through national mining, forestry and agricultural concessions [5]. However, the landscape has changed with the government aiming to develop the port and unlock Liberia's potential to become a vital trade partner. Liberia's infrastructure has gradually been

growing since the end of the civil war, and its development is closely intertwined with economic development. Two main actors have led the infrastructure growth. On the micro scales, the logistics industry is a key industry in increasing the competitive power of corporations. Furthermore, the logistics industry has an important mission in revitalizing and improvement of the competitiveness of other industries [6].

The Liberian Economy

The economy of Liberia is hugely underdeveloped, mainly due to the First Civil War from 1989 to 1996; Liberia itself is one of the world's poorest and least developed countries in the world. The war also caused a brain drain in the infrastructure and human resource sector and capital loss [7]. The civil war involved overthrowing the Americo- Liberian minority that ruled the country, The distribution of wealth is uneven, with the coastal districts receiving a more significant share of economic benefits than the hinterland, after which the administrative centers are the subsequent beneficiaries. Transportation is one of the leading sectors of the economy of Liberia. About half the land area is suitable for cultivation, though a small percentage is cultivated. Foreigners often operate commercial farms.

Traditional farms, which comprise the most significant number, are usually produced by slash-and-burn methods. In addition, President Charles Taylor's support for rebels fighting in Sierra Leone negatively impacted the climate for foreign investment. Although there are no official statistics, it is estimated that 85% of the population was unemployed in 2003 and that GDP grew at a negative rate of 31.3% during this year [8].

Public Procurement and Concessions Commission (PPCC)

The Public Procurement Concession Act (PPCA) [9] was under the past government to establish the Public Procurement and Concessions Commission (PPCC), which gives institutional structures for public procurement and Concessions, and the stipulation methodology and procedures for its existence. The mandates Commission/PPCC to regulate all forms of public procurement and concessions to maximize economy and efficiency, focusing on obtaining the best value for public expenditures and promoting the economic development of Liberia. The object of PPCC is to ensure that all financial and efficient use of public funds in which public procurement and ensure that public procurement and concessions are conducted in a fair, transparent, and non-discriminatory manner:

1. Developing of rules, instructions, regulations, and related documentation on public procurement and concessions procedures.
2. Review procurement and concessions documents and inspecting records that are necessary for preventing corruption of any in any given public institution.
3. Maintaining and publishing the list of suppliers, contractors, consultants, and prospective bidders who have been debarred from public procurement and communicate the list to procurement entities regularly and,
4. Conduct an independent review of complaints and appeals related to the procurement and concessions process and make decisions thereon.

Methodology of Study

This research gives a brief explanation of the research designed that has been employed, the research design used is a general plan of how the researcher goes about answering the research questions. (Creswell, 2003[10]. This study also adopted a descriptive research design. According to Shona McCombes (2019) [11], the descriptive research design is appropriate for identifying characteristics, trends, frequencies, and categories. According to Mouton (2001, p. 55) [12], "a research design is a plan or blueprint of how you intend to conduct the research". In

the same way that the research problem, aim and objectives of the research guide the research in a particular direction, an appropriate, well-planned research design will also guide the research process. The study aimed to collect data on the impact of logistics management on the Liberian economy. It was also to capture quantitative data to provide in-depth information about the economic and social effects of logistic management on the economy of Liberia.

Data of Collection

Data collection is the process of gathering and measuring information on targeted variables in an established systematic fashion, which then enables one to answer relevant questions and evaluate the outcomes (Demarrias, 2004) [13]. Data was collected from selected samples using a quantitative survey, a questionnaire containing structured questions; the researcher adopted open-ended questions for this study to get information that lessens information bias and makes it easy for the data analysis. Ensuring the validity and reliability of the research, the local supervisor reviewed and validated the information gathered for the study. The study employed a structured interview guide to all the objectives and selected respondents and interviews. The researcher pretested the instruments before they were used in the field.

Data Analysis

The researcher analyzed data using a quantitative approach. A questionnaire containing structured questions and open-ended questions were used in this study to get factual information about the economy of Liberia. [14] Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, and is used in different business, science, and social science domains.

The Result of the Research

This research presents the quantitative data analysis and its relation to previous studies of scholars and the literature reviews. The study provides a more precise and more in-depth understanding of the research. After analyzing the questionnaires and interviews conducted, the analysis in (Table 1), the researcher selected forty (40) of the questionnaires from each department of the Transit Authority to know the percentage of each option to factual see the impact of logistics management on the economy of Liberia. The antigraft institutions such as Public Procurement Concessions and Commission (PPCC), NTA management, Ministry of Finance Development and Planning (MFDP), Ministry of Transport (MOT), and Internal Audit Agency (IAA) are the watchdogs for proper implementation. The outcomes of this assignment will provide a guide in the development and deployment of an eProcurement System and other revisions that would play major roles in the attainment of the overall objectives of the PPCA [15].

Discussion

In the previous sections, some outcomes were presented. Firstly, one of the most important outcomes of the study was the positive impact of logistics management on the transport sector of the Liberian economy at the National Transit Authority (NTA). Thirty persons who constituted 75% of the sample size said logistics management impacted the NTA to a greater extent. Therefore, if the continuous use of proper logistics management in government institutions, this process will continue to yield results. The infrastructure, such as road pavement and adequate maintenance of all buses of NTA, will expand to other counties.

Limitation

This review was limited due to time and getting adequate information from employees of the entity in fear that it would expose itself to the public pressure but notwithstanding, the dismaying of employees. There were also few gaps in the data, which may have impacted the results. The quality of economic data for Liberia is inferior, owing to several problems: political instability, civil wars, and poor statistical and

reporting techniques. Additionally, this study is based on secondary annual series data whose significant disadvantages are the credibility and degree of reliability.

Conclusion

The study's primary purpose is to answer the research questions: What impact does logistics management had on the Liberia economy? What were the economic outcomes of logistics management precisely the National Transit Authority from 2015 -2018? What are the factors that lead to the impact of logistics management on the economy of Liberia? Does logistics management significantly affect the post-war recovery of Liberia transport? In the previous section, the theoretical framework was in detail compared with the study results. Since the survey outcomes did utterly fit with the literature review, the research questions were answered explicitly. On the other hand, the theoretical framework presented in this research suggests that the Government of Liberia can construct more pave roads and implement the proper use of logistics management. The transport sector through the National Transit Authority is fully implemented, and the country's logistics management has a significant impact.

Recommendation

The researcher has realized the aim of this research. There exists a significant impact of logistics management on the Liberian economy, especially the National Transit Authority. These antidraft institutions, such as the Public Procurement and Concessions Commission (PPCC), the Ministry of Finance Development and Planning (MFDP), the Ministry of Public Works, and the Internal Audit Agency (IAA), are critical institutions for the proper management of the government's spending, constructing quality roads and regulations. The research work has contributed extensively to the literature for the impact of logistics management on the Liberian economy, using NTA as a case.

Additionally, if these antidraft institutions can continue to institute and implement government policies coupled with the management of NTA, handling the entity's affairs will prove the vision of Her excellency madam Sirleaf about alleviating poverty from Liberia through the low-price cost of transportation in Monrovia and its environs. Although the analytical framework proved appropriate within the research environment, the transport buses are carefully managed and maintained as often as possible.

Table 1. What Impact does Logistics Management had on the Liberian Economy?

Options	Frequency	Percentage (%)
To Great Extent	30	75
To an Extent	7	17.5
To little Extent	2	5
To no extent	1	2.5
Total	40	100%

Source: Survey Questionnaire

Table 2. What were the Economic Outcomes of Logistics on the NTA?

Options	Frequency	Percentage (%)
Creating Employment	29	72.5
Building Road	7	17.5
Lack of National Income	5	12.5
Lack of Attention	2	5
Total	40	100%

Source: Questionnaire Survey

Table 3. What are the Factors that Lead to the Impact of Logistics Management on the Economy?

Options	Frequency	Percentage (%)
Effective logistics Management	33	82.5
Poor logistics management	5	12.5
Lack of Trust	2	5
None	0	0
Total	40	100%

Source: Questionnaire Survey

Table 4. Does Logistics Management Significantly Affect the Post-war Recovery of Liberia Transport?

Options	Frequency	Percentage (%)
To Great Extent	28	70
To an Extent	8	20
To little Extent	3	7.5
To no extent	1	2.5
Total	40	100%

Source: Questionnaire Survey

Conflict of Interest Statement

The paper Title: Assessing logistics management's social and economic impact on the Liberian economy (National Transit Authority 2015-2018). The author, whose name is mentioned immediately below certified, has **NO** affiliation with or involvement in any institution with non-financial interest such as personal or professional relationship, or cooperation in the subject matter.

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Information Overload and the Role of Librarians in Information Dissemination in Tertiary Institutions in Cross River State, Nigeria

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Abstract

The advancement in "technology" has brought with it an information explosion causing excessive information everywhere. Hence, there is a huge amount of information resulting in information overload. Information overload is being experienced everywhere, in public and private organizations, institutions, government officers, information users, individuals and so on. This study, therefore, attempts to examine the causes of information overload and the role of librarians in information dissemination in tertiary institutions in Cross River State, Nigeria. Seventy-two (72) librarians from tertiary institutions in the state were used as the population for the study. A structured questionnaire was developed by the researchers for data collection. Data collected was analyzed using mean and standard deviation. The result revealed that receiving repetitive massages, an explosion in the volume of information sources, and the advent of technological innovation, among others, are the major causes of information overload. The study also revealed that SDI, e-SDI, referral services, and CAS are the major ways through which librarians can disseminate information promptly to users. The study further revealed that information filtering, and information withdrawal, among others, are the major strategies used by librarians in Cross River state to improve and remedy information overload. Based on the findings, it was recommended, among others, that librarians and information professionals should provide effective and innovative ways/strategies for tackling the problem of information overload.

Keywords*: Academic libraries, Information dissemination, Information overload, Information, Role of librarians.*

Introduction

With the advent of new technological innovations, the rate of information production has accelerated rapidly. Consequently, the exponential growth of information in our society today has given rise to information overload, and the ability of information users to be able to be accessed prompt, relevant and reliable information for daily use is a major issue in the information process. Information overload is the difficulty a person faces when taking a decision in the presence of excessive information. Information is seen everywhere, on social media platforms, the internet and so on. The creation of new ideas necessitates the documentation of those ideas. People have been recording their thoughts, actions, ideas, and expressions in numerous ways. Thus, with the spread of literacy and the invention of new methods of recording one's thoughts and ideas, the body of knowledge created and accumulated by human beings started to expand slowly. Especially, as information about almost

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anything is merely a click away. People are bombarded with tweets, texts, whats App, blogs, emails, reports, streams of articles on Facebook, TV and many more with the help of devices such as smartphones, tablets, laptops and so on [1]. [2] maintained that the rise in paper documentation has created the need for the development of information retrieval systems. Hence, information is easily created, disseminated, and shared with others, and this started putting pressure on people's limited resources and time. People are now faced with the problem of how to choose the information that best meets their needs. The inability of information users to manage and process information and decide on what kind of information they require, and get it as quickly as possible to solve their information needs has resulted in information overload.

Different authors, however, have given different definitions to define the term information overload. [3] states that there is no universally agreed definition of information overload – it can mean several things to different people, such as having more relevant information than one can assimilate, or it might mean being burdened with a large supply of unsolicited information.

Generally, information overload refers to a situation when the information user fails to process any more information because of its enormity in size and volume. [4] and [5] maintained that Information overload is having too much amount of information which is offered within a short time and is difficult to comprehend and solve. Information overload occurs when the nature of the information is unspecific, vague, new, complicated, or compressed. Also, [6] noted that Information overload is the state of stress experienced when the amount of information given exceeds the limit of the user's information processing capacity. [2] saw information overload as an overabundance of relevant information that cannot be assimilated or being burdened with large quantities of unsolicited information which may be beneficial. In the same vein, Mayer sees information overload as a state that exceeds the limited human information–processing capacity. While [7] observed that, information overload is usually taken to represent a state of affairs where an individual's efficiency in using the information in their work is hampered by the amount of relevant and potentially useful information available to them.

The issues of information overload are multiple and complex. Hence, it is difficult to provide a simple "quick fix" solution. However, according to [8] there is no simple solution to information overload. Various solutions have been proposed to mitigate information overload. According to them, there includes the filtering strategy and the withdrawal strategy. The filtering strategy attempts to eliminate useless information from the source. Information is extracted to meet the interest of the person. While the withdrawal strategy minimizes the number of daily information sources to protect oneself from the bombardment of information from multiple sources. In the same vein, skimming or scanning in place of careful reading was seen by [9] as a strategy to cope with information overload. It is the duty of the librarian to see to it that only relevant and useful information is being made available to users, in that way, users will be able to get the exact information needed to solve their information needs. The librarians carry out these roles bearing in mind the interest of the information user, who is the focal point in information dissemination. Therefore, this study examined information overload and the role of librarians in information dissemination in tertiary institutions in Cross River State, Nigeria.

Literature Review

[1] observed that, various studies have been conducted on information overload over the years to see the development of the field as well as to study the scholar behaviour towards the

influence of information overload. According to them, the problem of information overload has been receiving increasing attention. However, because we live in an information age where information is growing exponentially, media revolution has changed the world, not only in terms of access but also in the way and manner in which information is produced using different channels and mediums. Thus, people from all works of life make their thoughts and ideas known through social media, thereby leaving the social space with different kinds of information. [8] saw information overload from a system point of view, according to them, information overload takes place when the amount of input to a system exceeds its processing capacity. In order words, information overload occurs when one is presented with an amount of information that exceeds one's cognitive capacity, and according to them, the term information overload is also known as infobesity or information anxiety. However, from a system point of view, information overload takes place when the amount of input to a system exceeds its processing capacity. It can also be perceived as when the flow of information is more than what we can be able to manage effectively. Thus, information overload occurs when one is presented with an amount of information that we cannot manage.

Causes of Information Overload

The root problem of information overload is the dilemmas people face in the face of indecision, although computer processing and memory is increasing all the time, the people that must use the information are not getting faster. Information overload is an increasing problem both in the workplace and in life generally. Information overload is when you are trying to deal with more information than you are able to process and absorb. The result is either that you delay making decisions, or that you make the wrong decisions. It is a symptom of the high-tech age, which is too much information for one person to absorb in an expanding world of technology. It comes from all sources, including TV, newspapers, and magazines as well as wanted and unwanted, regular mails, e-mails and faxes. The symptoms of overload are growth of incoming information, including electronic mail, an explosion in the volume of information sources and so on. [10] explained that there is information overload because more and more information is published every year, and this creates a problem for both users and managers of information. According to [11], the scenario of abundant or over-abundance of information could be traced to the 17th and 19th century when information became an important input to any human activity. In view of the need to send information compactly, the American Military during the Second World War resorted to the use of pictures through which a lot of information could be sent at a time with short notes than long prose. It was this approach that introduced visuals and audio into the information packaging system. However, [12] stressed that information overload has become a 'fashionable' problem today largely due to the way information and communication technologies have made it easier and easier to transfer information from one person to another and make available ever-increasing information resources in almost every field. The technologies include e-mail, voice mail, mobile phones, the internet, and organizational intranets and so on.

Also, [13] argued that the development of all kinds of communication support devices and software, such as Skype, Twitter, LinkedIn, Facebook, YouTube, iPhones, and iPads, provides additional sources of communication leading to information overload as well as the general openness of Web communication poses a problem for all information seekers, who face the task of looking for valuable facts in a vast sea of information. Hence, the lack of coordination in information technology planning is one of the problems resulting to

information overload. Although these issues are to a certain extent, being addressed at the technological level, [12] argued that technology development must go hand-in-hand with information policy. Stating that information policy is not a technological policy but a policy for information content, its management, its life cycle, and its relationship to the information needs of those working in the organization. Affirming this fact, authors like [14] and [15] focus on reducing information overload using different technologies. Hence, technology is blamed for causing information overload. They argued that technology merely provides the channels and mechanisms through which information is distributed or accessed. Affirming this view, [12] argued that the root cause of information overload is the stress created by modern management practices, which put peoples' job under threat, or which increase the general workload or otherwise create defensive behaviour. This leads to information behaviour that creates an overload on the individual. Confirming this, [8] pointed that the main sources of information overload are the internet, wireless communication technologies, TV, and newspaper. [16] also explains that there is information overload because more and more information is published every year, and this creates a problem for both users and managers of information.

One method for addressing the problem of information overload, according to [17] is through e-Selective Dissemination of Information (e-SDI). Accordingly, it is a system that attempts to facilitate users' information retrieval and filtering. The primary purpose, according to them, is to provide researchers with the latest publications on a specified topic. It is the information alerting service designed to keep individuals informed of new developments in their particular fields of interest by providing at regular intervals a listing of citations. The goal of this method is to deliver new information to users via library blog, library website, social media, text messaging, emailing and so on. Also, O'Neil, (2001) noted that e-SDI could give great benefit to users like saving the users time and effort and allowing them to concentrate on the specific information which relates to their interests. However, [17] suggested that e-SDI could give great benefit to users like saving the users time and effort and allowing them to concentrate on the specific information which relates to their interests. In the same vein, [19] emphasized the importance of this method to the librarian which will help solve the problems of information seekers by providing specific information that is needed. Accordingly, he outlined some objectives which include:

1. Providing current information about a predetermined area of discipline.
2. Receiving, scanning, and providing the right users the information at the right time.
3. Notifying users of the current information relevant to users' interest.
4. Using various resources to locate relevant information published elsewhere in the world.
5. Scanning current materials such as journals, current awareness bulletins and other significant resources.
6. Saving users' time.
7. Selecting relevant documents in the users' notice.

[20] noted that librarians should be more proactive in providing access to users using (CAS) current awareness services by keeping them aware of the current trends and development in their areas. Furthermore, [21] explained the importance of CAS to users. He maintained that CAS is a system of service which ensures that all the current information likely to be of interest to users is made available to them at the right time and in a convenient form. Also, the use of (SDI) selective dissemination of information in providing specific information to information seekers is a good method of getting information across to users. Consequently, [22] stated that, in this technological era, the role of information center

and information specialists has changed because of the rapid advancement of technology where users can access information anywhere and anytime. [23] noted that SDI strives to provide users with updated information that is related and applicable to their field of specialization. Nonetheless, [24] observed that Selective Dissemination of Information (SDI) was considered a specific information service used to overcome information overload in the 70s but in the 90s, with the emergence of the internet, the problem of overload began to be seen as a major problem.

Objectives of the study

The objective of this study is to examine the role librarians play in information dissemination in tertiary institutions in Cross River State, Nigeria. Specifically, the study seeks to:

1. Examine the major causes of information overload in tertiary institutions in Cross River State, Nigeria.
2. Ascertain ways through which librarians can improve information dissemination in the midst of overload.
3. Suggest strategies used by librarians to improve and remedy information overload.

Research Questions

The following research questions were raised to guide this study:

1. What are the major causes of information overload?
2. What are the ways through which librarians can disseminate information promptly in the midst of overload?
3. What are the strategies used by librarians to improve and remedy information overload?

Methodology

The design adopted for this study was a survey research design. The population of the study consists of 33 librarians from the University of Calabar, 14 from Cross River University of Technology, 5 from the college of Education Akampa, 13 from Federal College of Education Obudu (FCE), 5 from college of Health Technology and 2 from Institute of Technology and management Ugep bringing the total population to72 (seventy-two) librarians. The census approach was used due to the small size of the population. Data was collected using a questionnaire instrument, and the collected data was analyzed using descriptive statistics (mean and standard deviation). The questionnaires consist of two sections; sections A and B. Section A was designed to collect information on the demographic data of the respondents, such as age, sex, qualification, institution, and years of service. At the same time, section B consists of items answering the research questions. Modified 4-point likert-type scale responses of Strongly Agree (SA) Agree (A), Disagree (D) and Strongly Disagree (SD), respectively was used. 72 items were distributed, but only 69 items were returned and found usable.

Table 1. Population Distribution of Librarians in Tertiary Institutions in Cross River State

S.N\o	Name of Institutions	Institution's location	No of library staff
1	University of Calabar library	Calabar	33
2	Cross River University of Technology library	Calabar	14
3	Federal College of Education library	Obudu	13
4	College of Health Technology library	Calabar	5
5	Institute of Technology and Management library	Ugep	2
6	College of Education library	Akamkpa	5
Total			72

Source: From the librarian's office of the various institutions (2021)

Results and Discussions

The results of the study were obtained from the research question answered.

Research Question 1

What are the major causes of information overload?

Table 2. Mean response and standard deviation of respondents on the major causes of information overload

S/N	Item	Total	N	$\bar{x}$	C.M	SD	Remark
1	The difficulty in processing the right information needed per time	224	69	3.24	2.5	1.02	SA
2	Inability to decide which information to use and manage	87	69	1.26	2.5	0.85	D
3	Receiving repetitive messages	258	69	3.73	2.5	1.06	SA
4	Explosion in the volume of information sources	235	69	3.40	2.5	1.03	SA
5	The advent of technological innovations	248	69	3.59	2.5	1.04	SA
6	Inability to process and absorb information quickly	174	69	2.52 AV=2.93	2.5	0.92	D

Where:

N = number of respondents
$\bar{x}$ = mean
C.M = criterion mean
SD = standard deviation
AV = average mean

The result in Table 2 shows that a greater percent of respondents Strongly Agreed that they receive repetitive messages, with a mean value of (3.73) which is greater than the Criterion mean of 2.5 on a four-point scale and the standard deviation of 1.06. The result implies that receiving repetitive messages is a cause of information overload. The result also revealed that the advent of technological innovations, difficulty in processing the right information per time and inability to process and absorb information are causes of information overload with the mean scores of (3.59), (3.40), (1.04), (1.03) and (1.02) respectively. The study further revealed that only one area of the causes of information overload received a low mean score of (1.26) which was below the criterion mean value of (2.5) with a standard deviation of (0.85). This implies that a fewer number of respondents Disagree that inability to decide which information to use and manage is a cause of information overload.

However, judging from the average of 2.95, which is greater than the criterion mean value of 2.5, it implies that all these variables causes information overload in tertiary institutions in Cross River State, Nigeria. Also, the standard deviation of the respondent ranges from (0.85) to (1.06). Hence, the respondents were not too far from each other in their responses.

Research Question 2

What are the ways through which librarians can disseminate information promptly in the midst of overload?

Table 3. Mean Response and Standard Deviation of Respondents on the Ways Librarians can Disseminate Information Promptly

S/N	Item	Total	N	$\bar{x}$	C.M	SD	Remark
7	Through the use of Current Awareness Service (CAS)	208	69	3.01	2.5	1.01	SA
8	Through the use of referral services	223	69	3.23	2.5	1.02	SA
9	With the help of Selective Dissemination of Information (SDI)	241	69	3.49	2.5	1.03	SA
10	Through abstracting and indexing current periodicals	154	69	2.23	2.5	0.91	D
11	By organizing and arranging bibliographies.	168	69	2.43	2.5	0.92	D
12	Through electronic Selective Dissemination of Information (e-SDI)	222	69	3.21 AV= 2.93	2.5	1.01	SA

Where:

N = number of respondents
$\bar{x}$ = mean
C.M = criterion mean
SD = standard deviation
AV = average mean

Table 3 explained the ways through which librarians can disseminate information promptly in the midst of overload. The result revealed that a greater number of respondents strongly agreed that SDI, e-SDI, referral services, and CAS are the major ways through which librarians can disseminate information promptly, with the mean score of (3.49), (3.21), (3.23) and (3.01) respectively. This result revealed that the calculated mean value is greater than the Criterion means the value of 2.5. This implies that librarians in Cross River state disseminate information through the SDI, e-SDI, CAS, and referral services. Also, their standard deviation scores which range from (0.91) to (1.03) shows that the respondents were not too far from each other in their responses. Although, a few number of respondents Disagreed to the fact that abstracting and indexing current periodicals and organizing and arranging of bibliographies are not part of the ways through which librarians in Cross River state disseminate information promptly, with the mean score of (2.43) and (2.23), which is below the cut-off point of (2.5). However, given that the average mean of (2.93) is greater than the criterion means, the value of 2.5. The result indicated that librarians in tertiary institutions in Cross River state used the above-mentioned ways in disseminating information promptly to users.

Research Question 3

What strategies are used by librarians to improve and remedy information overload?

Table 4. Mean Response and Standard Deviation of Respondents on the Strategies by Librarians to Improve and Remedy Information

S/N	Item	Total	N	$\bar{x}$	C.M	SD	Remark
13	I can get the information I need using the filtering strategy	210	69	3.04	2.5	1.01	SA
14	I use the withdrawal strategy to process information	196	69	2.84	2.5	0.95	A
15	I only extract and process information I need per day.	242	69	3.50	2.5	1.05	SA
16	I process and manage only relevant information for users	252	69	3.65	2.5	1.08	SA
17	I use search engines to get the information I need.	247	69	3.57	2.5	1.05	SA
18	I use the catalogue method to get information	154	69	2.27 AV=3.15	2.5	0.84	D

Where:

N = number of respondents
$\bar{x}$ = mean
C.M = criterion mean
SD = standard deviation
AV = average mean

Table 4 presents the possible strategies used by librarians to improve and remedy information overload. From the result in table 4, it shows5 strategies used by librarians to improve and remedy information overload with a mean rating between (2.84) and (3.65) which is above the criterion mean value of (2.5) on a four-point scale. The result revealed that information filtering, information withdrawal, information extraction, processing of relevant information and the use of search engines are the major strategies used by librarians in Cross River state to improve and remedy information overload.

The result also showed that the use of the catalogue method to get information to users had a low response rate with a mean score of (2.27) which is below the criterion mean of (2.5). This indicates that, librarians in Cross River statedo not use catalogue methods as a strategy to improve and remedy information overload.

The result further revealed that the average mean score of (3.15) is greater than the criterion score of (2.5). This indicates that the strategies used by librarians in tertiary institutions in Cross River state are significant. Also, the standard deviation that ranges from 0.84 to 1.08 indicated that respondents were not too far from each other in their responses.

Discussion of Result

Based on the result of the study, it was revealed that the role of librarians in information dissemination using various ways and strategies in disseminating information to users is significant.

Research question one sought to examine the causes of information overload in tertiary institutions in the Cross River States. The result showed that the receiving repetitive massages, an explosion in the volume of information sources, the advent of technological innovation, difficulty in process information and inability to process and absorb information are the major causes of information overload. Given the average mean of 2.95, which is greater than the criterion means value of 2.5, the result revealed that all the variables cause information overload in tertiary institutions in Cross River State, Nigeria. This finding is in line with the studies

of [8] who observed that the main sources of information overload are the internet, wireless communication technologies, TV, and newspaper.

The result on research question two sought to ascertain the ways through which librarians can disseminate information promptly in the midst of overload in tertiary institutions in the Cross River States. The result revealed that a greater number of respondents strongly agreed that SDI, e-SDI, referral services, and CAS are the major ways through which librarians can disseminate information promptly in tertiary institutions in Cross River State. The findings confirm with the studies of [17], who observed that is through e-Selective Dissemination of Information (e-SDI) is a way of addressing information overload, and [20] noted that librarians should be more proactive in providing access to users using (CAS) current awareness services, by keeping them aware of the current trends and development in their areas. Research question three sought to determine the strategies used by librarians to improve and remedy information overload. The result revealed that information filtering, information withdrawal, information extraction, processing of relevant information and the use of search engines are the major strategies used by librarians in Cross River state to improve and remedy information overload. This implies that the strategies used by librarians to improve and remedy information overload are significant, judging from the average mean score of (3.15), which is greater than the criterion mean score of (2.5). This indicates that the strategies used by librarians in tertiary institutions in Cross River state are significant. This study is in line with the study of [8], who proposed a simple solution to information overload, using the filtering strategy and the withdrawal strategy.

Conclusion

The rapid advancement in global information resources and technology has made information growth an impossible task to control. Information overload is seen and experienced in every organization in Nigeria. Based on the result of the study, it was revealed that the major causes of information overload are receiving repetitive messages, explosion of information sources, advent of technological innovations among others. The result also revealed that librarians used various ways to disseminate information promptly in the midst of overload. The study further revealed that librarians in tertiary institutions in Cross River State uses various strategies to improve and remedy information overload. However, to face the challenges of information overload, librarians and information professionals have to enhance their skills on managerial, technical and electronic media to provide flexibility, ease of use and access. Also, it is the role of a librarian to provide effective ways for information users to be able to access information effectively and efficiently. The role of librarian is to integrate information systems and services using the most appropriate resources, ways and strategies through which users can access information promptly.

Recommendation

The following recommendations were made:

1. Librarians and information professionals should provide effective and innovative ways/strategies for tackling the problem of information overload.
2. Librarians should filter out extraneous information and only focus on the critical information which will be relevant for their users.
3. Librarians should be equipped with key skills and competencies which will help them strategized ways of disseminating information to users promptly.

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Conflict of Interest

There is no conflict of interest.

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Performance Appraisal System and its Implication on Employee Performance: A Study of Zambia Revenue Authority

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Abstract

Performance appraisal systems used by a multitude of organisations globally should pose a major concern to all who use this employee evaluation process. This is mainly because performance appraisals do have an effect on employees. Whether this effect is for good or bad is the primary goal of this paper. Using data from a named organisation, the study will strive to determine whether the performance appraisal methods of that organisation have indeed had intrinsic effects on the performance of individual employees and whether this has indeed trickled down to the entire organisation as a whole. Both quantitative and qualitative research approaches were chosen as a primary and secondary data source. Questionnaires and interviews were used for primary data collection. Secondary data were collected from different articles, books, and online sources as well as the organisation under consideration. The results showed that, indeed, inherent in a performance appraisal system may be factors that need special attention if it is to work out for the benefit of the organisation. Whereas the procedures of the system may in themselves be very beneficial, the implementation thereof may be lacking and expose holes that may need to be filled from top management, middle management, and supervisees alike in order for the organisation as a whole to realise the full benefit of the performance appraisal system. The researcher recommended that the organisation take these factors into consideration if they are to achieve organisational objectives and goals.

Keywords: *Appraisal, Employee, Management, Organisations, Performance.*

Introduction

This research study is based on an assessment study on the effects of performance appraisal systems on employee performance with a focus on the Zambia Revenue Authority (ZRA). Like other organisations, the focus is to optimise employee performance, which, if appropriately implemented, will translate into improved organisational performance [1].

Considering the fact that literature on performance appraisal fails to agree on the most effective way of conducting performance appraisals and most of the studies have been conducted in developed countries, with limited research conducted in Zambia and given that the Zambia Revenue Authority has the responsibility of collecting all government revenues in the country there is need to establish the effect of their current performance appraisal system on their employee performance. The question is, how effective is the current performance appraisal system on employee job satisfaction at the Zambia Revenue Authority?

In so doing, many things should be considered, including the fact that there are a number of factors that impact employee performance, namely: the personality, values, attitudes, perceptions, ability, and motivation of each individual employee. This study aims at

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determining how these factors can be utilised under the performance appraisal umbrella in order to achieve progressive work ethics for the organisation. In line with this, data collection to get data on this carefully considered these factors and considered how best to draw out all concerned stakeholders in the matter in order to get at the heart of it and draw out information form participants.

That said, it is important to note that a number of writers have coined their definitions of Performance appraisal based on the above. It is the process of measuring the job performance of individuals or teams in an organisation, [2]. It is also defined as the identification of the strengths, weaknesses and capabilities of individual employees so as to guide other human resource decisions [3]. Similarly, Armstrong asserts that performance appraisal is a process of managing the efforts of individuals or teams within an approved framework that contains set goals and standards, attributes and required competence for the attainment of organisational results [4].

Researchers and practitioners have developed and implemented various changes to the evaluation of the appraisal systems and procedures in an effort to improve on the accuracy and perceived fairness of the process [5]. However, various research has also shown that in spite of the attention and resources applied to the practice, dissatisfaction with the process still abounds, and the systems are often viewed by employees and other stakeholders as inaccurate and unfair. In spite of this, however, organisations have continued with the performance appraisal system without establishing whether it has an effect on employee job satisfaction.

The Zambia Revenue Authority conducts performance appraisal for its employees using the balanced score card approach, which is a strategic management and planning system. The balance scorecard is often used for purposes such as Communicating effectively regarding what the organisation wants to accomplish; Aligning the daily work of employees with organisational strategy; Prioritising on their product, project and services level in order to monitor and measure the progress of the organisation towards the strategic goals. In regard to this, the study sought to find out if employees are well aware of what the organisation seeks to accomplish and if this is well defined as appraisals are being conducted.

Furthermore, in order to identify the downfall in the internal function and also to improve on performance, the balanced scorecard is used as a performance metric. It works very well in providing feedback to the employees about their performance and outcomes. Employees were here asked if they did get feedback and if the foregoing was at all beneficial to them.

The crucial step when it comes to the balanced scorecard is data collection. The information gathered is further interpreted by executives and managers in the company to provide a guideline for decision making in the future. What it does not do, though, is assess the skills and abilities required of the employee to perform their duties [6]. The data collection, therefore deliberately looked into how this shortcoming is dealt with by the organisation.

Literature Review

Nyaoga [7], conducted a research study on the effectiveness of performance appraisal systems in private Universities in Kenya, Kabarak University in particular. His study showed that a performance appraisal system is the only tangible metric way by which an organisation can know the level of performance of its diverse employees. Although most employees were aware of the type of performance appraisal system used in private universities, such systems were not based on any serious formal purpose for which they were designed. The effectiveness of these appraisal systems only lay on the training of the employees involved in the rating/appraising process. Conclusively, due to these shortcomings, these private universities could not measure employees' performance

hence making it difficult to achieve the intended Human Resource Management objectives.

The gap here stems from differences in geographical localities between Kenya and Zambia and the difference in vision and missions between the two study areas, Kabarak University and ZRA.

Rao [8], conducted a study on a performance appraisal in a public sector in India. The objective of the study was to know if the performance appraisal system there helps to recognise employees' strength and weaknesses. The survey covering 588 officers indicated that about 98% of the respondents felt that the appraisal system should help to recognise their strengths and weaknesses. A fairly high percentage of them (over 60%) recognised that it is very difficult to have an objective assessment in any form of appraisal because human factors are always involved. This survey seems to have been conducted in a company that operates a traditional appraisal system and focuses on an open performance appraisal program that is based on direct engagement between the appraiser and the appraised. Thus, the study seems to be comprehensive and relevant to the present study.

However, it shows the gap of time having had been conducted 32 years ago and a gap of place, India, is quite a different place from Zambia in terms of economic development and geographical location.

Evaluating the performance appraisal system in the bank of Botswana was another study conducted by Migiro and Taderera [9]. A qualitative research design was used. Proportionate stratified sampling was used to select representative units from all there 9 departments. Questionnaires were then distributed to a random sample number representing 88% of responses. Empirical results indicated that the system is used to identify employees for promotion and to decide on salary awards.

However, it was also found out that the reward outcomes did not always show a positive reflection of the performance appraisal outcomes and that the system was not consistent. The article identified issues that needed to be addressed for the Bank's performance appraisal system to be effective and meet its objectives: regular training for both the employees and the evaluators, transparency in the implementation of the appraisal system, provision of continuous feedback to employees on their performance and reduction of inconsistency in the system across the Bank. Notwithstanding that, the study had limitations in the sense that the appraisal system was done only in one organisation, the Bank of Botswana. Also, the researcher used only one method to collect data, the questionnaire, thus, limiting the chances for triangulation of the information obtained from the survey. Therein also lies the gap between this study and the study under discussion here.

Research Gap

There are mixed empirical findings on the relationship between performance appraisal systems and employee performance. While some researchers argue that performance appraisals have positive effects on employee performance [10-12], other scholars refute this positive relationship and argue that performance appraisal is associated with deteriorating employee performance [13-15].

However, the majority of these studies have been carried out in Western countries. Due to political, socio-cultural, and economic differences, this conclusion cannot be generalised in a third world country like Zambia. Therefore, this illustrates the presence of a gap with regard to the influence of performance appraisal systems on employee performance.

Zambia Revenue Authority

The Zambia Revenue Authority (ZRA) was established on the 1st of April 1994 as a semi-autonomous agency under the Zambia Revenue Authority Act, now chapter 321 of the Laws of Zambia. That culminated in the former departments of Income Tax and Customs and

Excise of the then Ministry of Finance being brought together under the revenue authority. The mission statement of ZRA is to optimise and sustain revenue collection through integrated, efficient, cost-effective and transparent systems, professionally managed to meet the expectations of all stakeholders.

The functions of the authority are to collect and account for all revenues and provide advice on matters relating to the administration of tax in the country. The authority is headed by a Commissioner-General, and it is divided into a number of departments. The members of staff are divided into management staff and the non-management staff.

The performance appraisal guide for the Zambia Revenue Authority views the staff performance appraisal as an important management tool which enables the employer and the employee to establish the extent to which organisational and departmental goals are achieved, staff performance meet set targets and goals and individual capacity, competencies learning, and growth are developed. ZRA carries out appraisals for the management staff ZRA based on the balanced scorecard and the non-management staff. The appraisal period covers one year, giving the supervisor the opportunity to review the progress.

Statement of the Problem

An effective appraisal system must identify an individual's strengths and weaknesses and indicate how such strengths may be utilised, and weaknesses overcome in order to realise the organisations' success [16]. This ensures that the best employees are retained by the organisation. Clearly, there is a direct link between performance appraisal and organisational performance.

Needless to say, most organisations, to their detriment, have continued with the performance appraisal system without establishing whether it has an effect on employee performance. Considering the fact that literature on performance appraisals fails to agree on the effective way of employee performance and given that the Zambia Revenue Authority has the responsibility of collecting all government revenues in the country, there is a need to establish the effect of a performance appraisal system on employee performance at the authority.

Therefore, the question is, how effective is the performance appraisal system on employee performance at the Zambia Revenue Authority? The purpose of the study will be to determine if the appraisal system at the Zambia Revenue Authority has a bearing on the individual employee and on the performance of the organisation as a whole.

The study's general objective was to assess the effects of performance appraisal systems on employees' performance with a focus on the Zambia Revenue Authority. The specific objectives of this study are:

1. To examine the extent to which employees' awareness on the appraisal system leads to effective employees performance at ZRA.
2. To investigate the extent to which employees' knowledge of the appraisal system leads to effective employees performance at ZRA.
3. To determine the extent to which performance appraisal management leads to effective employees' performance at ZRA.

Research Methodology

A mixed methods research design was considered so that the researcher could have a holistic picture of the issue under investigation as well as overcome the weaknesses of each one of them and take advantage of their strengths. The design was chosen with a view to combining the collection and analysis of both quantitative and qualitative data to better understand the research problem in a single study, as well as overcome the weaknesses of each one of the methods while taking advantage of their strengths.

Both qualitative and quantitative primary data collection relied on interviews and

questionnaires looking at the effects of performance appraisal systems on employees' performance with a focus on Zambia Revenue Authority. Primary data was mainly obtained through semi-structured questionnaires with some study participants from ZRA and interviews were held with key informants basically management and non-management stuff. Further, the researcher conducted the study through direct participation during an internship and therefore, there was a possibility of seeing and accumulating data from the events associated to the selected topic.

The target population of this research was the ZRA staff in Lusaka. However, during the collection of data a letter explaining the purpose of the study and aspects of confidentiality and anonymity of respondents was attached to the questionnaires.

The total sample for this study was 100 respondents, which was considered to be sufficiently representative of the population. That number is suitable because it fulfilled the requirements of efficiency, representative, reliability, flexibility, and precision of the study. Purposive sampling was used in the selection of participants in the study area.

The possible research participants were approached, and the aims of the study were explained to them. After ensuring that they had understood the information, they were then requested to freely-consent to participate in the study. Once the data was collected, the filled-in questionnaires were edited thoroughly. A well-developed coding scheme was used in order to ensure that data coding followed an unambiguous set of prescriptions of how all possible answers were treated and what numerical codes were assigned to particular responses. The function of the coding process was to create codes and scales from responses which could be summarized in various ways.

Coding for closed questions was done during the design of the questionnaires. Open-ended questions were coded using themes which emerged from the data. Similar themes and content categories were given the same codes. The data was then entered on a computer and analysed by means of SPSS computer program. Descriptive statistics were then used to summarise the data into frequencies and percentages where appropriate. SPSS tables were exported into excel for the generation of more customised tables and graphs, which were then taken to Microsoft word for the report writing.

Thematic analysis was employed to analyse qualitative data. and content. Using this qualitative analysis technique, steps were adhered to by the researcher in the analysis of qualitative data. Firstly, the researcher had to peruse through the collected data through interviews and identified information that was relevant to the research questions. Irrelevant information not related to the specific objectives and research questions was separated from relevant information. Secondly, the researcher identified themes from the respondents' descriptions of their experiences. Material relevant to a certain theme was placed together. Thirdly, direct quotations were used to present the findings.

These direct quotations were used to reflect the deep thoughts and feelings of the respondents on what their perceptions were in relation to the problem under investigation. The relevant information was broken down into key quotations which reflected specific thoughts of the respondent. The quotations were presented in narrative form. The researcher also took necessary ethical steps to safeguard the rights, interests, and sensitivities of informants; Recognising that such revelations were going to have far-reaching implications for the participants.

Results

The demographic profile shows the results of the 100 questionnaires distributed to the participants from the sample. These results were used to answer the three (3) questions representing the objectives of this study. Of the

100 questionnaires, there were 72 respondents. Of the 72, 65.25% were female, representing 47 of the 72 and 34.75% were male, representing 35 males.

First Objective: How does Employee Awareness on Appraisal System Lead to Effective Employees' Performance at ZRA?

The results revealed that 40 agreed and 32 strongly agreed that employee appraisal awareness leads to employee efficiency and sustainability. 13 said they did not get adequate preparation notice, showing an area of improvement. The same could be said for the number of employees who feel they are not involved enough in conducting the appraisal. All agreed when it came to participation in setting objectives and criteria, showing good response when it comes to involvement. However, the number of people that are not involved in the appraisal results discussions poses yet another red flag.

Table 1. Objective (i) Results

	Ag.	**SA**	**Dg**	**SD**	**NS**
Efficient and Self sustainable	40	32			
Sufficient notice to prepare for Performance Appraisal	14	45	13		
Employees involvement in conducting Performance Appraisal	50	9	4	9	
Participating in setting objectives and criteria for performance appraisal	61	11			
Involvement in discussion of Performance Appraisal results	39	18	15		

Key for Tables: Ag- Agree, SA- Strongly Agree, Dg- Disagree, SD- Strongly Disagree, NS- Not Sure

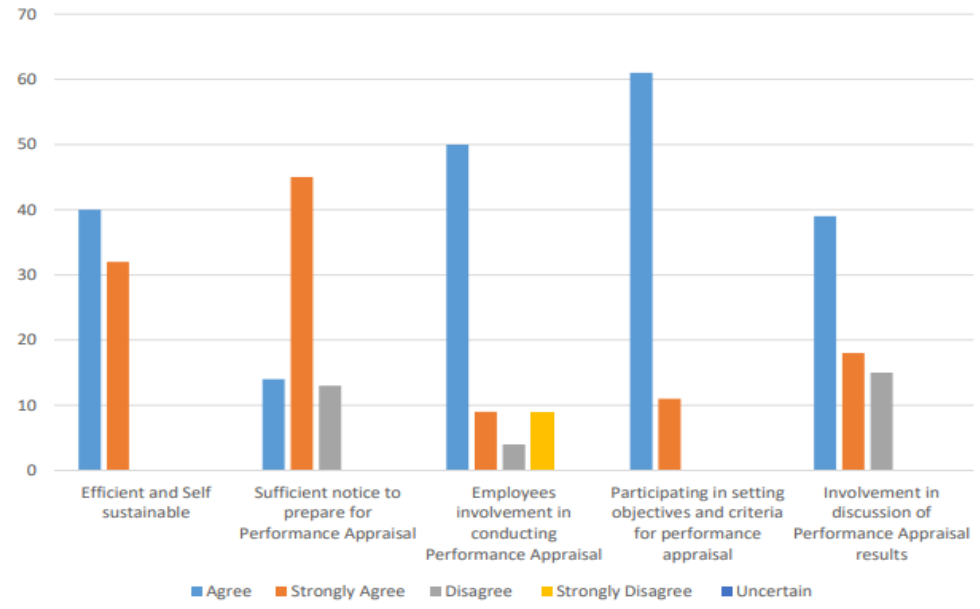

Figure 1. Results for Objective 1

Second Objective: How does Employees' Knowledge of the Appraisal System Lead to Effective Employees' Performance at ZRA?

Table 2. Objective (ii) Results

	Ag	SA	Dg	SD	NS
Employees understanding of Performance Appraisal Practices	35	20	17		
Employees' training regarding performance appraisal systems	40	30	2		
Accurate and Fair performance Appraisal	15		39	15	2
Performance feedback after evaluation	47	15	10		

Key for Tables: Ag- Agree, SA- Strongly Agree, Dg- Disagree, SD- Strongly Disagree, NS- Not Sure

The results showed that of the sample, 55 understand the appraisal process, 17 for that sample is quite a number that should be a cause for concern. It is a very good sign that the organisation has put in needed effort in performance appraisal training, as shown from the impressively high numbers. However, there is a need for improvement when it comes to the accuracy and fairness aspects. The same could be said for feedback post-appraisal. A number of employees felt that the appraisals may be tainted with partiality and another good number of them revealed that they were not given feedback once the appraisal process came to its finality.

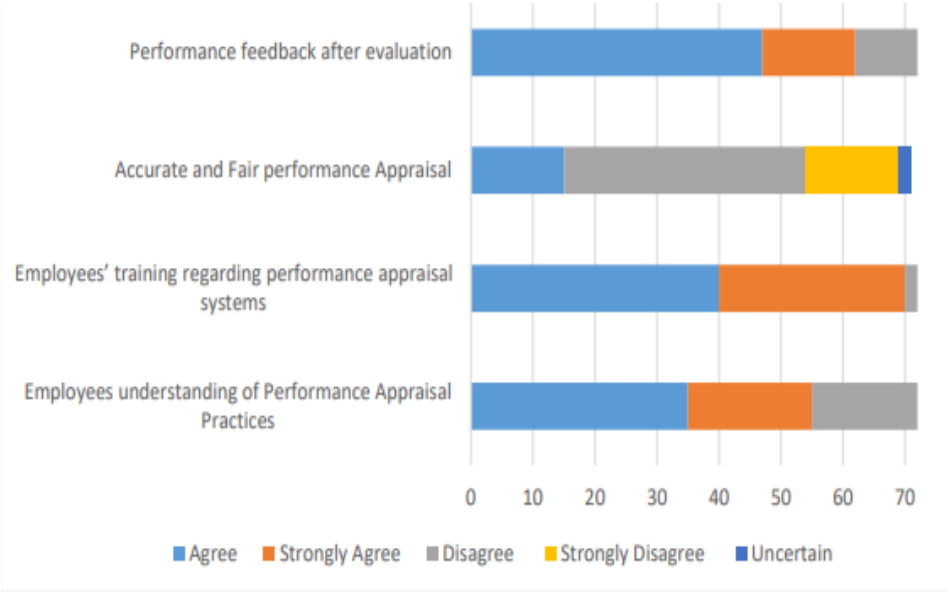

Figure 2. Results for Objective 2

Third Objective: To What Extent does Performance Appraisal Management Lead to Effective Employees' Performance at ZRA?

Quite a good number here felt appraisals have improved organisational communication. However, a very high number are uncertain about whether it also improves productivity. Another high number disagree that appraisals do not build work interrelations. A good number feel it does enhance job performance, though. However, it goes without saying that general job performance to a large degree, is dependent on communication amongst all organisational employees regardless of rank; as well the interrelations among said employees.

Table 3. Objective (iii) Results

	Ag	SA	Dg	SD	NS
Improving communication	42	23	7		
Increases productivity	32	10			30
Builds work interrelations	24	12	36		
Enhance Job performance	48	16	8		

Key for Tables: Ag- Agree, SA- Strongly Agree, Dg- Disagree, SD- Strongly Disagree, NS- Not Sure

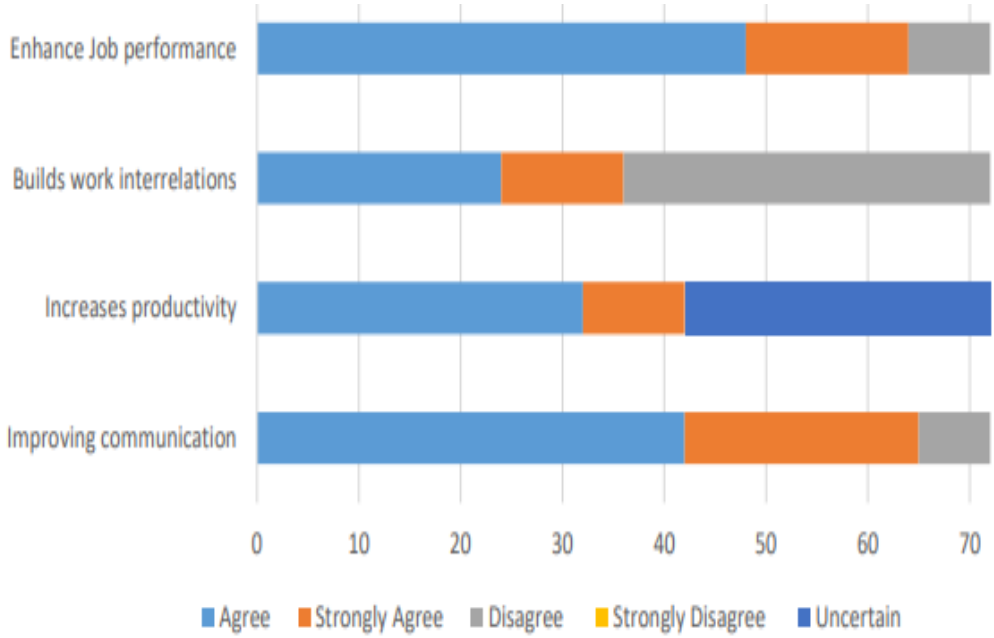

Figure. 3. Results for Objective 3

As per the Managerial Interviews Results from questionnaires only meant for those in management positions, the researcher got an insight into further answers to the problem statement. The purpose of this questionnaire was to get the overall view from managers. Of the respondents, at least 8 are in managerial positions. The results from this mainly account for the qualitative data that was collected and analysed. In line with the First Objective, the employees are to a large extent keen on participation and in laying down objectives, basically showing that the PA system at ZRA is highly effective. It must be noted that this is a big plus for an organisation of its magnitude because it shows that generally, a large number of the workforce is self-driven.

However, the organisation may want to look into the number of employees who do not seem to understand the importance of the appraisal system, as shown by the numbers of those that disagree with involvement as well as feel they don't get much-needed feedback after an appraisal. This could easily boil down to an attitude of disinterest, but it could also mean the organisation needs to put the effort in making sure all are involved in this all-important exercise and are given feedback thereafter so that they are fully aware of what direction they are to take in their service to the organisation. Another cause for concern is the number of those that do not seem to get their feedback after a PA exercise. Employees may also feel like important information that could have been shared with them previously was held back. Consistent sharing of suggestions throughout the year, not just at appraisal time, can go a long way to increasing acceptance of appraisal ratings.

Overall, there is an above-average level of awareness and satisfaction of employees with

regards to the PA system. But to better this, PA awareness along with its objectives, could also be encompassed as part of the initial orientation programs so as to lessen on employee ignorance regarding the practice.

Coming to the Second Objective, the results here showed that quite a number of employees understand performance appraisal systems, but not all of them. There is quite a number of those that don't. This is so despite the high number of those that agreed to having gone through training. This could be a flag for the organisation to review its training methods and make sure that all come out said training with full knowledge regarding performance appraisals. When it comes to the fairness of the practice and feedback, once again, quite a large number responded negatively. The perception of employees about the outcomes and uses of performance appraisal and its results is very important. They are more likely to be receptive and supportive of the practice if they see it as a useful source of feedback which helps to improve their performance. They will then be able to embrace and contribute meaningfully. Aspects like motivational tools should be made use of, while personal biases should be kept aside during the procedure so as to make sure the full potential of all employees is tapped into.

On the other hand, the negative responses could be a sign that it is seen as an unreasonable management exercise for micro-management, for instance. It is important that the organisation take strides to clearly explain the process and get employees to agree and get involved. Otherwise, it becomes an exercise in futility which is counterproductive.

Regarding the Third Objective, the extent to which performance appraisals affect the performance of employees, the results show that when it comes to improved communication, the numbers are high. However, we see a decline with regards to improving productivity and building interrelations. The question on the enhancement of job performance seems to be above average.

Management needs to look into why employees are uncertain about the connection between appraisals and productivity. The very fact that the evaluation carried out is based upon predetermined objectives should boost employee morale; as they should come out of the appraisal with renewed vigor, bearing in mind appraisals determine wage rise and promotions. According to Petersen, the extrinsic motivation to earn more in this case, influences employees to put in extra effort and better performance [17].

A luck of Interrelation may reflect a need for more team-building exercises and similar staff engagement activities. Individuals make teams, and in turn the combination of these teams makes for strong organizations.

It is, however, encouraging to see that job enhancement ranks quite high as this is a very important aspect that fosters morale and good energy among employees. This is especially important because working for such a big organisation can be very demanding. For those that feel differently, management should look into factors such as incentives and the reward system as links to enhancement.

Further, using the results from the Managerial Questionnaires, the researcher learned that giving feedback to employees is not always easy because sometimes this feedback is may not be well received. Although they reiterated how important honest feedback is, this was still identified as the reason some managers may sometimes not give proper or any feedback at all, something that the organisation needs to look into. Several studies indicate the presence of a positive correlation between feedback and work motivation [18; 19].

A way to improve on this aspect would be to explain how the appraisal ratings are arrived upon. This calls for Interpersonal communication were the aim is not just to soften the blow but to gain insight into how they can improve. It should also be noted that feedback is a way for managers to provide support to their subordinates. A study by Cory, Ward, and Schultz, found that employees who receive

support after an appraisal process indicate that such support contributes significantly towards creation and generation of ideas, [20].

There was a general agreement that a great way to improve employee acceptance of an appraisal process is to involve them. Clear explanation regarding what will be done, the behaviors that are expected of them, as well as the criteria on which they will be evaluated can increase employee morale for the practice. This calls for open communication. There were also some suggestions regarding encouraging completion of self-appraisals as these give insights into the employees' disposition.

It was also observed that some managers may have trouble allowing their subordinates to express their views. It is human nature to feel a higher position and makes our opinion the only one that matters. Being understanding of employees' feelings on matters is very important. They must be made to understand that a rating can only change when an improvement is made and that the purpose of the appraisal is to give them information to help them improve. Another important outcome of giving employees a voice is the likelihood of uncovering misunderstandings. If an employee believes they are doing well and are unaware anything is wrong, they will not know a change in performance is needed.

Most importantly, the results reveal that all the managers are very well aware that good performing employees means great performance for the entire organisation. Much of the problems that the organisation will need to fix are people issues and how these affect the seriousness with which performance appraisals should be regarded.

Relation to Other Researchers

This study confirms with most studies that, indeed the actual importance placed upon the practice of performance appraisals is relative. This was discovered during a study conducted by Nyaoga, were it was found that the effectiveness of performance appraisal systems in private Universities in Kenya was relative as these existed just as a matter of formality [ibid]. Another one conducted by Mackenzie on performance appraisal systems for organisational success found that the current processes focus on dealing with diminished performance issues [21]. Subsequently, the efforts of the individual are not necessarily aligned with the desired organisational direction, and little incentive exists amongst managers to challenge the current processes or encourage risk-taking to improve service delivery. Yet another one conducted by Rao on performance appraisal in a public sector in India, with the objective of finding out if the performance appraisal helps to recognise their strength and weaknesses; showed that a fairly high percentage of them (over 60%) recognised that it is very difficult to have an objective assessment in any form of appraisal because human factors are always involved.

Conclusion

The purpose of this study was to assess the effects of performance appraisal systems on employees' performance with a focus on the Zambia Revenue Authority. It was specifically aimed at examining the extent to which employee awareness of the appraisal system leads to effective performance at ZRA, to investigate the extent to which their knowledge of the PA system leads to their effective performance and determining the extent to which performance appraisal management leads to effective performance.

According to survey results approximately 68% generally feel the PA system has been successful in the organisation and is able to achieve the required objectives. Whereas 32% feel the system needs improvement in certain pivotal aspects. For big organisations, such as ZRA, the red flags raised here, i.e., employee uncertainties regarding appraisal feedback and involvement etc., should be taken into consideration and fixed as soon as is reasonably possible. The many pluses should also be taken

note of because for such big organisations, there is only ever room for improvement. An understanding of the phenomenon of Performance Appraisals helps with this and should be an imperative endeavor for excellence. Therefore, the theoretical implications we can draw here are that a big and important organisation like ZRA needs to have a performance appraisal system in place as it is a driver for better performance. To achieve this, the organisation has to ensure that all stakeholders understand the overall objective of the organisation and their role in achieving it. This was clearly brought out in the findings under Data Analysis. This will help in making sure the right processes are put in place in regulating appraisal systems, as per the needs of the organisation and its employees, as brought out under the literature review.

Further, the managerial implications as per the findings of the research under Data Analysis; are that management needs to be cognizant of the fact that performance appraisal systems are a yardstick in determining the level of the employees' performance in comparison with the standard performance expected of them. Performance that meets this standard should be duly acknowledged and recognised, whereas any gaps should be promptly bridged using human resources development techniques provided by the organisation.

Further Research

It is the researcher's recommendation that further research be put into rewarding employees after performance appraisals. This could have a downside that has been brought out by several scholars, [22; 23]. Apart from there being a downfall, other scholars have done research in this regard [24; 25].

It was noted that the Zambia Revenue Authority has tied remuneration to performance appraisals. The said downside was not explored under this study, but the researcher recognises the importance of management looking into this issue so as to know what is best for the organisation.

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Conflict of Interest Statement

The author certifies that she has no affiliations with or involvement in the organisation with any financial interest in the subject matter discussed under this article.

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