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An Integrative Literature Review on Technology Adoption by African SMEs

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Abstract

This literature review analyzes the drivers and barriers to technology adoption by African small and medium enterprises. To achieve this, previous literature on the subject was examined. The paper critically evaluates prior research on the topic and identifies gaps in the existing literature. The integrative approach was used in this literature review. The adoption factors and barriers to technology by African small and medium enterprises were synthesized by analyzing the different documents. Finally, new research directions were proposed.

Keywords*: Technology, Adoption, Barriers, SMEs.*

Introduction

Technology adoption is one of the most discussed topics in the information systems literature, especially in developed countries, notably in Europe and North America. But the dynamic around trend has been evident in recent years in developing countries across Asia, Africa, and Latin America [1]. This enthusiasm is largely due to the multiple advantages offered by new technologies [2]. It is acknowledged that technology offers multiple benefits to businesses and, consequently, the whole economy [3].

The potential benefits of technology for developing economies are likely to be even greater. ICTs are recognized as enablers of SME success [4]; and therefore, enablers of economic growth [5]. Besides, as the same source indicates, new technologies increase information availability, provide new communication methods, reshape production processes, and improve the efficiency of numerous business practices. Technologies can be used to empower companies in creating new jobs and thus contribute significantly to the reduction of unemployment [6].

Yet, despite this general interest in new technologies, African businesses still lack knowledge and adoption of new technologies [7]. Several factors make it difficult for African SMEs to use new technologies. These factors include, but are not limited to, poor internet access, intermittent power supply, high cost of technological infrastructure [8], high software costs, the lack of commitment by top management, the poor level of user knowledge in terms of information systems, and the unavailability of high-quality external expertise [4]. The low penetration of technology among African SMEs is of concern and therefore deserves researchers' attention. In addition, few studies seem to have examined the challenges of technology adoption in Africa. This study consists of a literature review on the adoption of new technologies by African SMEs. The purpose of the study is to further develop the existing body of knowledge and the existing literature on ICT adoption by SMEs.

Methods

This study is an integrative literature review that examines issues related to technology

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adoption in Africa. It particularly examines the drivers and barriers to technology adoption in Africa. An integrative literature review examines, criticizes, and synthesizes existing literature on a given topic to generate new knowledge [9]. This kind of literature review aims to synthesize the existing literature to generate knowledge [10]. The researcher, therefore, identifies the relevant literature on their research topic [11]. Accordingly, we have identified relevant literature around concepts such as technology adoption, and technology adoption drivers, technology enablers, barriers to technology adoption in Africa.

Literature Review

This literature review focuses on two main themes, namely the drivers of the adoption of new technologies and the barriers to their adoption.

The researcher must examine the relevant literature from databases, journals,[12], and other sources to conduct an integrative literature review. From this perspective, we identified literature in databases and journals specializing in management and information systems. Only relevant journal articles were included in this study.

Technology Adoption and Diffusion

The theory of technology adoption and diffusion has been studied in various studies (e.g. [13-16]). Several models have been developed to examine this. One model has stood out over the years. This is the TAM model developed in 1986 by [17]. The model asserts that actual technology usage is predicted by perceived ease of use, and perceived usefulness [17]. This model has been tested by several empirical studies [18-20]. In addition to perceived usefulness and perceived ease of use, the literature identifies other factors in the adoption of new technologies. These factors include quality of service, quality of the system, satisfaction, safety offered by the system [21], subjective norm, willingness, appropriateness of use, result demonstrability [22], technological anxiety [23], optimism, innovativeness, discomfort, and technological insecurity [24]. These factors are mainly related to individual technology adoption and are not necessarily the same when it comes to companies.

Previous literature has identified some factors for the adoption of new technologies in SMEs. These are the technological context, the organizational context, the environmental context, and the personal context [24].

Following [25], the technological context describes the internal and external technologies relevant to the company. The same source suggests that the organizational context refers to the characteristics of the organization, such as the size and scope of the business, the management structure, and the internal resources. In addition, the organizational context reflects management's involvement in IS and the level of internal technology knowledge [24]. The environmental context describes the arena in which a company operates: its industry, its competitors, and its relations with the government [26].

The individual/management context consists of the owner/manager's innovative capacity, knowledge of ICT, attitude, innovation, age, gender, and education [24]. Based on the literature, whether at the individual or organizational level, ICT adoption is influenced by a series of factors that are related to the organization's internal or external environment; or related to individuals: managers or employees.

Results

In this section, we present literature on technology drivers and barriers to technology adoption and the most adopted technologies by SMEs in Africa.

ICT Adoption by African SMEs

Despite the important role they can play in the continent's economy, African SMEs suffer from several constraints that contribute to their often-early demise [26]. The same source argues that

African SMEs are often informal due to legalization constraints in addition to suffering from financial constraints. In addition, as reported by the same source, technology can be one of the solutions to the problems of SMEs on the continent.

The use of emerging technologies is proving to be the missing piece in boosting the development of African SMEs. Nevertheless, a poor level of technology adoption is noted on the continent [3].

However, the gradual adoption of technologies is evident on the continent. A survey of companies in french-speaking African countries [27] reveals that companies are progressively adopting technologies mainly for the following reasons: SMEs adopt ICT to facilitate communication with different stakeholders, boost communication with the outside world, and thus limit the isolation of enterprises. Moreover, according to the above-mentioned source, companies have adopted ICT as they consider it to be a crucial tool for the future.

A survey conducted in Ghana [28], identifies perceived ease of use, perceived usefulness of the technology, compatibility, and cost-effectiveness as influencing ICT adoption. A similar survey of South African SMEs [29] states that technology adoption is primarily influenced by the ability of the firm to adopt ICT.

However, the study suggests that this capacity refers to income levels, cognitive skills, technology infrastructure, and other related aspects. Another study with similar results was conducted among companies in African countries [30], the results are that economic development, education/training, and infrastructure play an important role in technology adoption by African companies.

Alongside these factors, the related literature identifies others that influence technology adoption in the African context. These include external pressure, competitive advantage [31], relative advantages [32], ICT support, ICT training [33], human capital [34], organizational leadership, and organizational characteristics [35] among other factors.

Barriers to Technology Adoption in Africa

The low technology adoption by African SMEs is subject of interest to researchers. Studies on this topic have been carried out all over the continent [4]. This section presents the main barriers to ICT adoption as identified in the literature on information systems.

SMEs face several barriers that complicate their use and adoption of ICT [36]. The barriers to technology adoption by SMEs revolve around four main areas: business awareness and access to infrastructure, security framework confidence, use of ICT by business partners, and business process adaptation [37]. From these factors, it appears that the company's internal characteristics and external environment may hinder its technology adoption.

According to [38], some barriers to technology adoption are uniquely related to SMEs. These include hardware unavailability, the need to ensure immediate returns on investment as opposed to long-term ICT investment, resistance to change, preference for older technologies, lack of IT and technical skills among employees, time constraints, lack of awareness of business benefits of ICT, of ICTs, security problems, and, finally, lack of ICT adoption among employees and business partners.

Our survey in the DRC [4] identifies some constraints to technology adoption by local SMEs. These constraints relate to the characteristics of local SMEs. These are characterized by low financial resources, low internal and external IS expertise, and low management involvement. Besides the above-described business characteristics, the study identifies high infrastructure costs, expensive software and hardware, and poor access to the Internet as barriers to computerization.

Similar results were reported in 2016 from a survey on barriers to internet adoption by South

African SMEs. This survey identified the lack of financial resources and high costs of ICT systems, the lack of skilled workers able to handle or maintain ICT systems, the lack of knowledge to implement ICT systems, and the lack of knowledge and understanding of ICT [39] as the main barriers to ICT adoption.

Other barriers are highlighted when it comes to ICT adoption by African SMEs. These include fear of security threats [31], poor technology perception [40], lack of government support [41], and poor electricity supply [42].

Obviously, African SMEs face several barriers to adopting new technologies. These barriers may include several others in addition to those previously mentioned.

Conclusion

Technology adoption has become essential for businesses regardless of size. The trend towards technology, although slow, is also evident in African SMEs. This literature review examines the drivers of technology adoption by African SMEs. It also examined the main constraints to technology adoption mentioned in the literature on technology adoption in Africa.

In terms of adoption determinants, SMEs' internal characteristics, technological context, and external environment influence their technology adoption. Specific characteristics of SMEs such as lack of resources and skills; unavailability of infrastructure may hinder technology adoption.

This review highlights the key factors to be considered in ICT adoption. However, the question related to the adoption of ICT by SMEs has not been fully addressed. A review can be conducted around the most adopted ICT systems in Africa to profile the current state of technology adoption on the continent and possibly propose innovative solutions.

Conflict of Interest

The author declares no conflict of interest.

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Effects of Enhance Adherence Counselling on Viral Load Suppression Among High Viral Load HIV Seropositive Patients in a Nigerian Tertiary Health Facility

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Abstract

Background: EAC helps clients overcome adherence hurdles and improve ART adherence. This study examines the effect of EAC on viral load suppression. Method: This quantitative study aims to determine the impacts of enhanced adherence counselling (EAC) on viral load in Defence Headquarters Medical Center, Abuja, Nigeria. The medical records of HIV clients on ART included in EAC were extracted from the hospital and analyzed to determine the impacts of EAC on viral loads suppression of clients in the program. Result: Almost half of the PLWHIV in EAC have been on ART for 6-10 years (47.6%), 42.9% for more than ten years, and 9.5% have been on ART for 1 – 5 years. 76.2% of respondents were on the 1st line of the ART regimen, while 23.8% were on the 2nd line. 97.6% of clients enrolled for EAC were at the WHO stage I HIV infection, and only one (2.4%) was in stage IV. 50% tested for viral load was due to viral blip, 28.6% due to unsuppressed viral load and 21.4% were tested to monitor their VL. Furthermore, of the 33 clients with viral load results, 14 (42.4%) had very low-level viremia (<50 copies/ml), 10 (30.3%) had low-level viremia (50–1000 copies/ml), but 9 (27.3%) still had high-level viremia (>1000 copies/ml). 42.9% enrolled for EAC because of pill burdens, 31.0% due to irregular dosing frequency, 19.0% because of pill social problems, and 2.1% were people lost to follow-up returned..

Keywords: *Antiretroviral therapy, EAC, Viral load.*

Introduction

Enhanced adherence counselling (EAC) is a continuous and repeatable process that includes a structured assessment of current adherence, exploration of specific barriers the patient must overcome, assistance in identifying solutions and addressing barriers, and development of an individualized adherence interventional plan that improves viral load suppression and reduces subsequent treatment failure (1). EAC's objective is to assist clients in identifying and gaining insight into their unique adherence hurdles, exploring strategies to overcome these barriers, and developing a thorough adherence plan to improve ART adherence (2,3). Enhance adherence counselling program's objective is to increase ART adherence to maximize treatment outcomes.

The EAC package includes an assessment of patients' specific needs, education sessions, and adherence counselling, as well as the 5As Access, Advise, Agree, Assist, and Arrange application when providing adherence support to

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people with detectable viral loads (4). If ART is not adhered to, the viral load will increase above 1000 copies/ml. A persistently high viral load indicates non-adherence. When patients are started on ART, they are watched and assisted in improving their adherence. To increase viral suppression, enhanced adherence counselling is needed (5,6).

The primary goals of drug adherence counselling are as follows:(a) Assist patients in making informed treatment decisions based on their unique circumstances, (b) Assist the patient in developing a habit of medication adherence, (c) Strengthen the patient's ability to manage and maintain the therapy.

Treatment adherence has evolved into a critical medical, financial, psychosocial, and health policy concern today. Before initiating ART, the WHO recommends a period of education and preparation targeted at maximizing adherence.

It is critical to design a practical procedure or program that optimizes patient goals, increases medication adherence to ART, and guides patients through the many stages of drug adherence counselling. Promoting treatment adherence in HIV patients requires a systematic approach.

A 2017 study conducted in Western Nigeria discovered that 86.5 percent of the individuals experienced viral load suppression after thorough adherence counselling (7,8). The results of a 2017 study conducted in Western Nigeria on the 90-90-90 ambitious targets found that 787 (86.5 percent) of the individuals experienced viral load suppression of less than 1000 RNA copies per ml over the time of observation after thorough adherence counselling (7,8). This study examines the effect of EAC on viral load suppression.

Materials and Methods

The Federal Capital Territory (FCT), also known as Abuja Federal Capital Territory, was established as an administrative territory in central Nigeria in 1976. The Federal Capital Territory consists of 6 different area Councils: Abaji, Abuja Municipal, Bwari, Gwagwalada, Kuje and Kwali. These six councils cover a total land area of approximately 7,290 km² (9). According to world population review statistics, Abuja has a population of 3 464,123 (10).

According to the National Agency for the Control of AIDS (NACA), Abuja has a total HIV/AIDS prevalence rate of 1.5% (11). The study population comprised HIV seropositive clients initiated on ART in Defence Headquarters Medical Center, Abuja, Nigeria, from January 2019 to December 2021. A structured data extraction template was designed using Microsoft Excel to extract clients' data involved in EAC from the hospital database. A trained abstractor was employed to conduct the data extraction and reviews. The researcher checked for completeness, clarity, and consistency of data. Data quality assurance was also carried out to ensure quality and reliable data extraction. The extracted data were exported into IBM-SPSS version 28.0 data analysis. Descriptive statistics were performed, presenting outcomes as frequency tables, percentages, pie, and bar charts.

Results

The demographics of PLWHIV included in EAC, whose file reviewed at the defence headquarters medical centre, Abuja shows that of the 42 cases, 22 (52.4%) were males and with age group 31 – 50. A higher proportion attained secondary (45.2%), 32 (76.2%) were married, and 19 (45.2%) were employed (Table 1).

Table 1. Background Characteristics of HIV Clients Enrolled for EAC in Defence Headquarters Medical Centre Abuja

Characteristics	Frequency (n=42)	Percentage
Gender		
Male	20	47.6
Female	22	52.4
Age category		
10-30	7	16.1
31-50	22	52.4
Above 50	13	31.0
Highest level of education		
Primary	8	19.0
Secondary	19	45.2
Tertiary	15	35.7
Marital Status		
Married	32	76.2
Single	8	19.0
Separated	2	4.8
Occupation		
Students	5	11.9
Unemployed	5	11.9
Employed	19	45.2
Business	13	31.0

Almost half of the PLWHIV enrolled in EAC have been on ART for 6-10 years (20, 47.6%), 18 (42.9%) for more than ten years, and 9.5% have been on ART for 1 – 5 years, as shown in Figure 1.

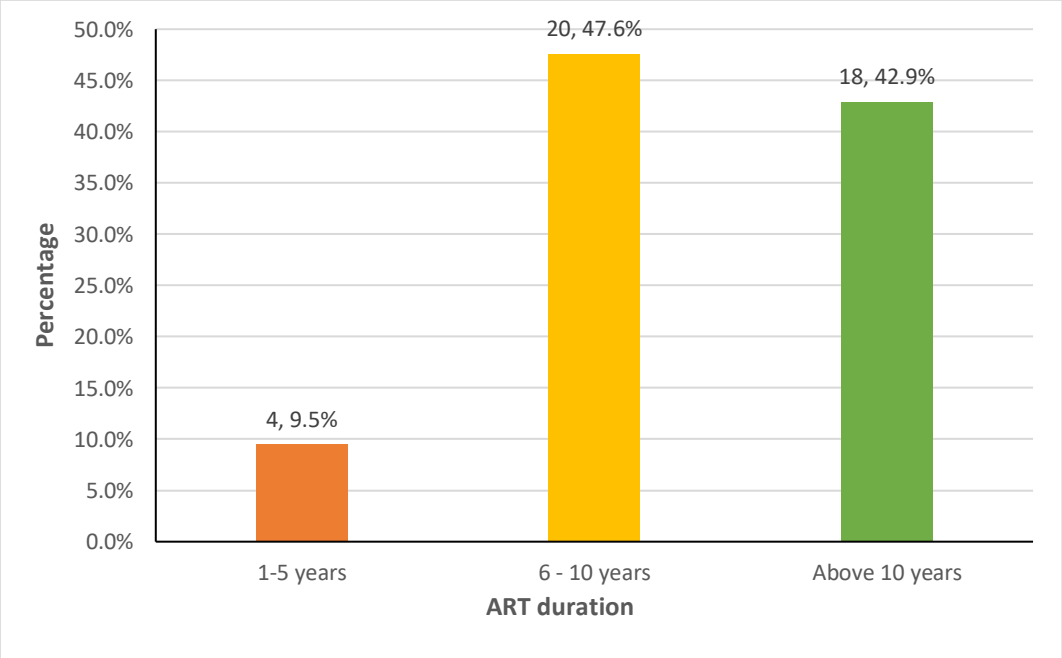

Figure 1. Length of ART of PLWHIV Enrolled in EAC

As shown in Figure 2, a high proportion of the PLWHIV enrolled in EAC (76.2%) was on the 1st line of the ART regimen, while 23.8% were on the 2nd line.

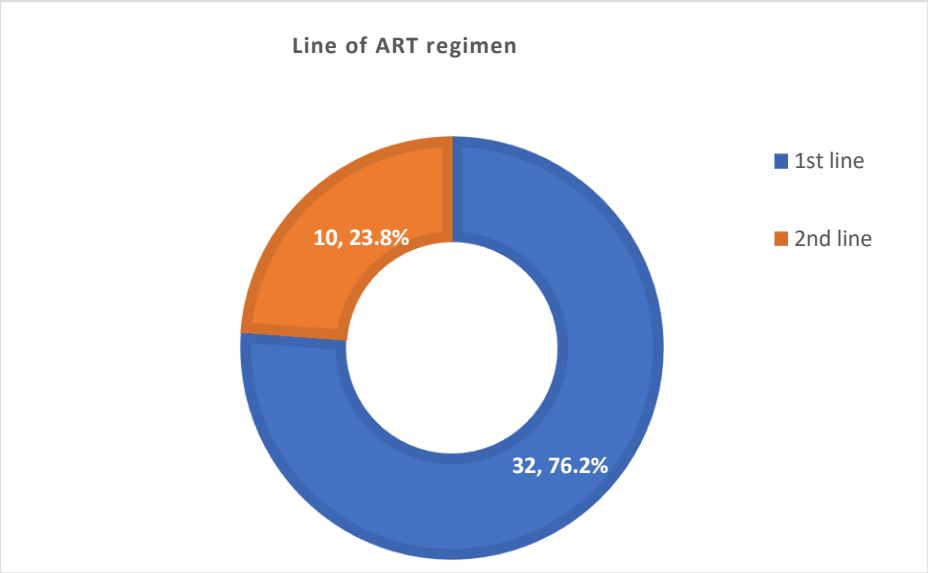

Figure 2. EAC Enrolled Clients' ART Regimen

A significant proportion (97.6%) of clients enrolled for EAC were at the WHO stage I HIV infection, and only one (2.4%) was in stage IV (Figure 3).

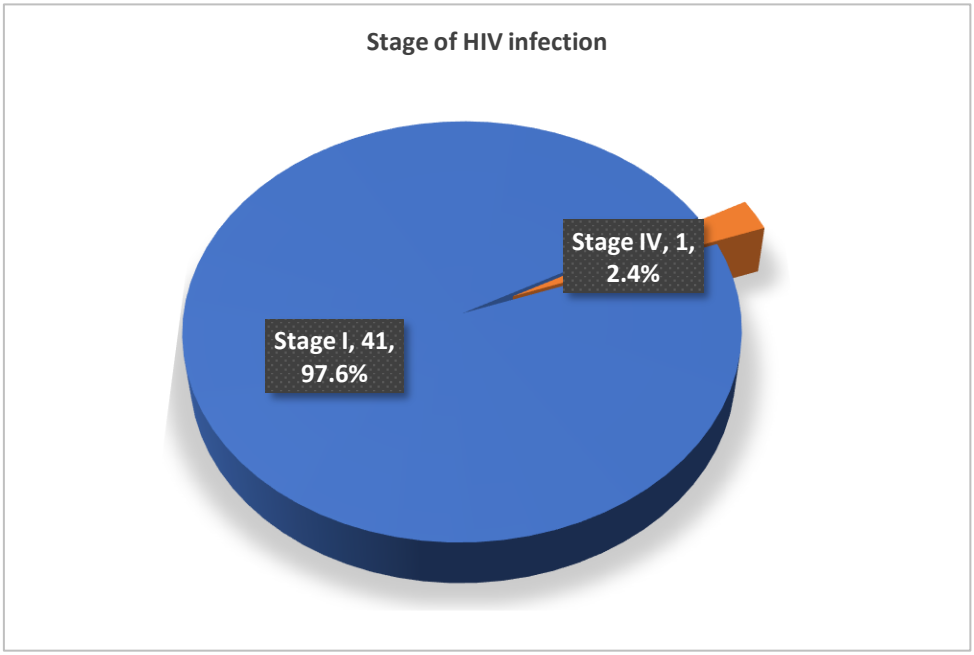

Figure 3. WHO HIV Stages of EAC Enrolled Clients

The reason for testing VL for HIV clients enrolled in EAC is shown in Figure 4. Fifty percent said it was due to viral blip, 28.6% due to unsuppressed viral load and 21.4% were tested to monitor their VL.

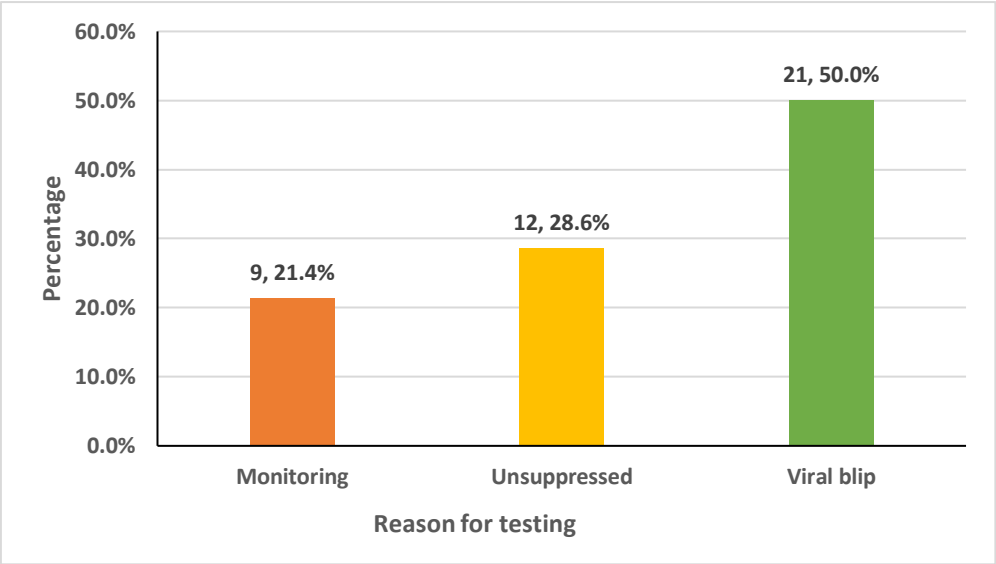

Figure 4. Reason for Viral Load Test

As reported by PLWHIV clients enrolled for EAC, the majority (42.9%) were included in the program because of pill burdens, 31.0% due to irregular dosing frequency, 19.0% because of pill social problems, and 2.1% were people lost to follow-up returned (Figure 5).

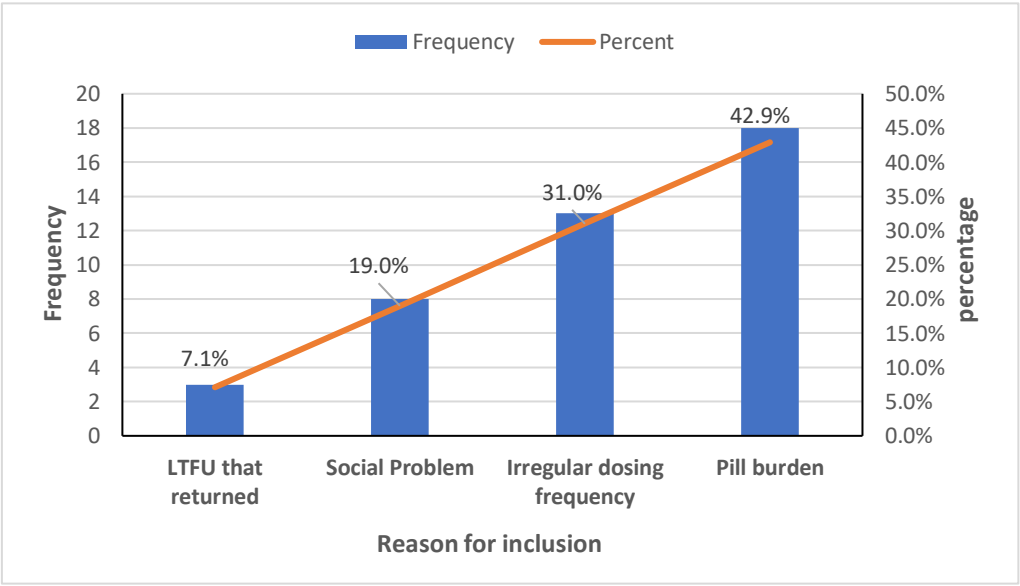

Figure 5. HIV Client's Reason for EAC Inclusion

As shown in Table 2, of the 33 clients with viral load results, 14 (42.4%) had very low-level viremia (<50 copies/ml), 10 (30.3%) had low-level viremia (50–1000 copies/ml), but 9 (27.3%) still had high-level viremia (>1000 copies/ml).

Table 2. Viral Load of PLWHIV after Three Months in the EAC Programme

VL status	**Frequency**	**Percent**
Very low-level viremia (<50 copies/ml)	14	42.4
Low-level viremia (50–1000 copies/ml)	10	30.3
High-level viremia (>1000 copies/ml)	9	27.3
Total	**33**	**100.0**

Discussion

The findings of this study show that a larger number (47.6%) of HIV patients enrolled in EAC used ART consistently for 6-10 years, whereas the lowest percentage (9.5%) used it for one to two years. This indicates that most of them have been on ART for a long time. The possible reason for this could be because ART slows the progression of HIV to AIDS and reduces infections and mortality among those living with HIV (12). In addition, ART lowers viral load in HIV-infected individuals, thereby reducing the risk of onward HIV transmission (13–15).

Some studies suggest that earlier initiation of ART may also improve retention rates in care and medication adherence and promote the more rapid achievement of viral load suppression (16,17). As a result of this evidence, the World Health Organization (WHO) now recommends immediate initiation of ART for all people diagnosed with HIV, regardless of CD4 count (18). This was similar to the findings by (19) and (20).

However, the findings of this study were contrary to a study by (21), which discovered a lower rate among those who have been on ART for a long time. Based on the findings of this study, a high proportion of the PLWHIV enrolled in EAC (76.2%) was on the 1st line of the ART regimen, while 23.8% were on the 2nd line. The study also revealed that most HIV patients who joined EAC were at WHO stage I HIV infection, and a large percentage of these patients were on the first line of their ART regimen.

The findings of this study were contrary to a study carried out by (20), who discovered that the majority of the participants were on the WHO clinical stage 2 and 3 and 2nd line ART regimen.

This study shows that most participants had low viral load viremia levels after attending enhanced adherence counselling. This shows that EAC is very much effective in suppressing the HIV viral load to an undetectable level. This was consistent with a study by (22) and (23). The possible justification for this could be due to the timely completion of their EAC session, which might have contributed to better adherence and response to ART therapy (24,25). This could also be as a result of the patient taking ART for a long time, as recorded in this study. A person's viral load is considered "durably undetectable" when all viral load test results are undetectable for at least six months after their first undetectable test result. This means that most people will need to be on treatment for 7 to 12 months to have a durably undetectable viral load (26).

Since p*oor adherence to ART is* the most common reason for high viral load, WHO recommends enhanced adherence counselling (EAC) for 3–6 months for people with high viral load count before diagnosing first-line treatment failure (27). It also aids in adhering to ART treatment and suppresses viral load to an undetectable level (23). However, the findings from this study were contrary to the result of a study by (6) and (28) and (29) in which EAC does not influence viral load suppression. It may also be worth exploring strategies to address the pill burden, such as the use of combination ART drugs, to improve adherence and reduce the burden of taking multiple medications. Further research is needed to fully understand the factors contributing to viral blips and identify ways to mitigate this issue.

Conclusion

According to this study's findings, most participants enrolled in EAC who have been on ART for 6-10 years were on their first line of ART regimen and WHO stage 1 infection level. Also, the findings of this study show that the majority of the HIV client had low viral load after three months on EAC. This show that EAC was effective in suppressing the viral load of HIV patient. Furthermore, pill burden was found to be a major reason for inclusion to EAC, likewise viral blip for viral load testing.

Overall, this study shows that EAC positively impacts viral load suppression among PLWHA. Given these results, it is recommended to continue promoting and expanding the EAC program to reach more HIV patients and improve their health outcomes.

Conflict of Interest

Authors declare no conflicts of interest

Acknowledgement

Nil.

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The Role of Motivation in Enhancing Staff Productivity - A Case Study of Onyix and Company Nigeria Limited

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Abstract

In this study, how to increase performance and productivity through motivation is of primary interest in Onyix and Company Nigeria Limited. The lack of motivation has formed the bedrock of anti-work vices which is a problem hindering the achievement of organisational goals and objectives. Motivation connotes how to make employees work optimally in the pursuit of the organisational goal. Descriptive research method and different motivational theories were used to identify and proffer solutions on issues affecting worker's productivity. To achieve this, a survey using the questionnaire was done to gather data, inferences from the responses were drawn. Systematic sampling method was used in selecting the sample size from the population of staff in Onyix and Company Nigeria Limited. Obstacles that impeded workers motivation were established, these obstacles were analysed, a long time and immediate strategies for achieving improvement in the productivity of the organisation through motivation was the focus of this research. Three hypotheses were formulated, and conclusion was drawn from these hypotheses. Calculation and analysis were obtained using the Statistical Package for Social Sciences (SPSS) to get the Pearson Product Moment Correlation Coefficient while the Chi Square analysis was used to analyse the stated hypotheses. Summary of the findings was carried out, it was evident that the low productivity of the employees is attributed to several management functions, provision of inadequate incentive, supervision, work methods etc, these key factors hinder higher productivity. Recommendation and conclusion were drawn from the analysed data.

***Keywords**: Motivation, Productivity, Questionnaire, Systematic Sampling, Performance.*

Introduction

The role of motivation in enhancing staff productivity cannot come into play without the organisation and the staff who are the subjects of productivity through motivation. [1] gave credence to this assertion when he posits that organisation is a purposeful creation of man, deliberately designed to achieve certain purposes. This implies that there can be no basis for an organisation without people who are there to help realized organisational purposes or goals, while at the same time striving towards the ventilation and actualisation of their individual aspiration.

The effective motivation of human resources has for quite some time been of paramount interest to management practitioners, organisation psychologist and administrators. This agrees with the verdict of [2] opined that of all the tasks of managing, the human component is the central and most important because all else depends on how well it is done. In carrying out this function, a manager either swims or sinks, that is, objectively done, the manager will be building a solid management practice on social and motivational principle, but failing this, will create for him a demoralised work force.

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Motivation is described as behaviour caused by some stimulus but directed towards a desired outcome. Motivation explains why people behave the way they do. The more managers understand organisation member's behaviour, the better they should be to influence that behaviour and make it more consistent with the accomplishment of organisation objectives. Since productivity in all organisations is a result of the behaviour of organisation members, influencing this behaviour is a manager's skill to increasing productivity.

Motivation is a management function that has generated the most misconception and controversy on the part of many. Despite the avalanche of expressed dissatisfaction and criticism, organisation finds it difficult to do without it because there are rarely other options. However deficient it may be, without motivation, it will be extremely difficult in getting "Productivity" out of people. It is therefore a veritable instrument of management since workers look forward to personal aspiration via salary increment, promotion, training, welfare package etc.

Without motivation how can an organisation attain its strength or how can it install effective personnel or management capable of strategic re-positioning or re-engineering. The above paragraph epitomises the significance of motivation as mentioned earlier that the overriding aim of an organisation is to achieve its goals. However, motivation techniques, although with certain shortcomings since individual workers have different needs, goals, and aspiration, it may be difficult to use a common motivator as an inducement.

Productivity on the other hand should be a concern to all staff because the wealth of a nation invariably relates to it. The challenge of every organisation is to increase productivity. [3] defined productivity as "that which relates to corporate achievement over a given time frame to the objective(s) determined in advance of action". This is the goal of management and to realise this objective, workers should be induced to work hard. In a working environment, workers often hoard their energy and exhibit varying degrees of negative, anti-work tendencies capable of causing goal frustration. Human negative behaviour is induced by unrealised hope and aspiration. The degree of an organisation concern for workers, largely explains why they engage in certain behaviour, and are the driver or impulse within the individual that cause the behaviour.

Productivity is a result of human effort at work, and it has direct bearing on the wealth of an organisation and the standard of living. It is in recognition of motivation as a critical, important management function and tool to increase productivity and my observation of the negative behaviour of the workforce which underscores the quality of human and physical resources in Onyix and Company Nigeria Limited that has motivated this choice of topic – The role of motivation in enhancing staff productivity.

The purpose of the research is numerous and interwoven and seeks to examine the role of motivation in the performance of Onyix and Company Nigeria Limited staff, specifically, the study is aimed at the following:

a. To critically evaluate the effective dynamics of work motivation and job satisfaction of employees of Onyix and Company Nigeria Limited towards achieving organisational goals.
b. To examine the extent in which the needs of the staff is satisfied which invariably increases organisational performance.
c. To analyse the ramifying problems that affect the climate of the organisation in increasing worker's productivity.

Statement of the Hypothesis

This is a tentative statement that shows the expected event which will occur under certain circumstances. The below hypotheses are tested to show the relationship between motivation and workers productivity in Onyix and Company Nigeria Limited.

1. Hypothesis (H1): Higher monetary incentive to workers will lead to increase in organisation's productivity.
2. Hypothesis (H2): The extent to which an organisation succeeds in satisfying the needs of its staff will determine the degree in which the goals of the organisation are realised.
3. Hypothesis (H3): The productivity of workers will decline when the climate in the organisation is hostile than when it is friendly.

Significance of the Study

It is a universally acknowledged fact that in most organisations, the single most potent tool for ensuring the career progression of employees is motivation. It is also an incontrovertible fact that motivation forms the basis for workers retention and longitudinal of service. It is therefore important for an organisation to put in place effective, objective, and sound motivational system in ensuring organisational survival. Motivation should be a managerial strategy to galvanise, propel and energise employees to higher performance and increased productivity. Unfortunately, in most cases, motivation outcome has tended to instigate discontentment and ill feeling on the part of workers leading to demoralisation and de-motivation.

The first significance of this study is that it will lead the human resources of Onyix and Company Nigeria Limited into action and this will improve the level of efficiency of the staff. A motivated employee performs higher than a de-motivated one and this will invariably lead to increase in productivity and reduction of operating cost.

Secondly, the reputation and goodwill of the organisation is very important, so this study will encourage the management to keep employees loyal, appreciated, needed, and feel as part of the company. Motivation will lead to staff stability, the longer the staff works in the organisation, the more experience he gathers and will promote the image of the organisation since he sees himself as part of the company.

In addition, motivation will help in the development of cordial relations between the employees and the management. It will help employees to be more interested in the company as they will feel that the interest of the organisation is not different from their interest.

Furthermore, Onyix and Company Nigeria Limited will be able to benefit from this study as the constant training and different learning experiences will give the staff the feeling of success and encourage them towards achievement, self-confidence in carrying out their official duties, self-direction towards ensuring that the company's goals are achieved.

More so, it will enhance co-operative goal structures in the organisation and enable staff to see themselves as a team in accomplishing shared goals and objectives. The study will contribute to the growing body of knowledge in the field of motivation in the organisation and will highlight the problem and errors associated with motivation in the organisation for rectification.

Delimitation

The study focuses on the twin concepts of motivation and productivity, which are the most nagging issues in management. The special interest is why workers hoard their effort/energy which is very critical at the success of any organisation.

This study intends to enquire into how workers can be stimulated to release the loaded energy in them, thereby increasing their productivity. In other words, the question "the role of motivation in enhancing staff productivity" will serve as a road map to the conduct of this research.

This study will attempt an analysis of the various theories of motivation and related topics to an extent, for their applicability to the organization and by extension Nigeria as a whole. This is more so given the fact that all these theories were couched on Euro-American

organisation milieu and as such has no general application in our own case.

The study will also examine the state of productivity vis-a-vis the nature and the type of incentive schemes on the ground as an explanation for the prostrate state of our economy and not look at the global economic trend as responsible for the poor state of productivity in the economy.

Literature Review

Conceptual Classification of Motivation

Over the years, management practitioners, authors, literatures, personnel administrators have described the concept of motivation from various perspectives. The term motivation was derived from a Latin word "MOVERE", meaning "TO MOVE" is a process which starts with physiological or psychological deficiency, which activates a drive aimed at a goal.

A lot of questions have been asked on what motivation is. Motivation moves staff into action and makes them enthusiastic to intensify their willingness and desire to use their energy to achieve the objectives of the organisation.

The question on motivation is how one can be motivated and what should be done to increase the level of motivation. There are two dimensions to motivation; one, from the employee's point of view, which is making employees to perform their duties in the best way with desire and fulfilment, and the other being from the managers point of view, which is, ensuring that the employees work better, more effectively and efficiently.

Motivation involves getting somebody to do something just because they want to do it. It is very crucial for an organisation to function and survive. In the absence of motivation, workers will not give in their best and the performance of the organisation will be negatively impacted.

In the 1900s motivation was thought to be only monetary but during the 20th century it has shown that there are more factors than only money that motivate employee. From the foregoing, one can argue that motivation is grounded in the assumed power of motivational incentive - monetary, non-monetary and intangible/intrinsic rewards - to induce man to work to the best of his ability as a mean of actualising organisational goals and actualising self needs. Whatever it takes to induce workers to perform by appealing to their physical and emotional need constitutes motivation.

Theories of Motivation

Several motivation theorists assume that motivation influences the performance of all learned responses which means learned behaviour occurs only when it is energised. The major question on the mind of psychologists is whether motivation has a primary or secondary influence on human behaviour.

There are many motivation theories which attempt to explain the nature of motivation. The different theories provide a framework which directs the attention to the problem and how best to motivate staff to work willingly and effectively. However, the search for a generalised definition and theory of motivation at work appear a vain quest. A major determinant of behaviour is the situation in which individual workers find themselves.

Classification of Motivation theories

Content theories of motivation

Abraham Maslow's Hierarchy of Needs

In examining the theories of motivation, the Maslow's Hierarchy of Needs come into play and [4] was the first to use employee's needs in motivational theory. Maslow as the chief protagonist of motivation has attracted management theorists.

In this theory, Maslow proposed that basic needs be arranged in hierarchical structure of prepotency and probability of appearance.

1. Physiological Needs: This involves the basis physical needs that sustain the human life. For example, food, water, shelter, air, sex, clothing, elimination etc. These needs must be satisfied to sustain life and until these needs are satisfied to the degree

necessary to sustain life, other needs will not motivate people.

2. Safety Needs: There are desire for protection against physical danger, threat, fear of losing a job and deprivation. This safety needs involves protection against favouritism, discrimination, and arbitrary administration of organisational policies.
3. Social Needs: In this, people try to satisfy their friendship, affection, interacting with others, acceptance, group membership etc, because they are social beings that needs to belong and be accepted by others.
4. Esteem Needs: People want to be held in esteem by themselves and by others. This comprises of confidence, self-respect, competence, achievement, independence, freedom, needs for status, recognition, appreciation, importance, and prestige.
5. Self - Actualisation Needs: This is the highest level of need. It comes only when other needs have been satisfied. It includes the realisation of one's potentialities, self-fulfilment, and continued self-development.

[5] adopted this theory by stating that employees move up the hierarchy when a need is substantially realised. The human beings desire is to satisfy his basic needs first and thereafter seek for higher needs when encouraged.

Limitations of the Maslow Hierarchy Need Theory

The Maslow's hierarchical theory has been questioned that it has some deficiencies. The Maslow's hierarchical theory has been questioned that it has some deficiencies. [6] practical evidence moves to a two-level hierarchy rather than the Maslow five level hierarchy.

Maslow believes that the psychological and safety needs are arranged in hierarchical fashion, but [7] opined that any one of these needs may be singly important depending on the individual.

Maslow's position is that human beings have needs and that they are arranged in a hierarchical order prepotency that the need active in a person is what motivates him, and this need should be identified by managers to motivate them. [8] supports this view that human needs do not need to be fulfilled to get benefits. For example, when an employee is hungry, he can still be happy with his friends.

The highlight of Maslow's theory is that human needs strongly influence their behaviour in any organisation. This is arguable by the Classicalists that postulated that money is the primary motivator; the need theorists objected and contended that the workers are motivated primarily by intrinsic rewards, which are provided by the workers themselves. By and large, both agree that money motivates but disagree on the extent of its potency.

In addition to Maslow theory's limitation, staffs that are frantic about recognition and fame would not neglect his well-being to attain them. This goes contrarily to what Maslow's theory highlights that the basic needs may not need to be satisfied for staff to acknowledge his higher needs.

Furthermore, the theory did not take into consideration that different managers view situation differently and might find it difficult identifying the employee's level of need and this will invariably reduce staff motivation at the place of work.

Frederick Herzberg's Two - Factor Theory

This theory is focused on the outcomes of satisfaction and dissatisfaction. [9] opined that not all factors in a workplace motivate workers, certain aspects of the job cause satisfaction and motivates but certain aspects also cause dissatisfaction. Satisfaction and dissatisfaction which are two sets of outcomes are separate entities and not opposites.

The factors that relate to job satisfaction are referred to as satisfiers or motivations. These factors bring out positive feelings among the

workers and have traits in both job and organisation contexts. This includes achievement, recognition, responsibility, the work itself, opportunity for promotion and advancement etc. The listed factors lead to job satisfaction when they are present while the factors that relate to job dissatisfaction includes job content or the environment of the job, it describes the employee's relationship to the environment in which the job is performed which include pay, technical supervision, company policy and administration, supervision, working conditions, relationship with peers, supervisors, subordinates, salary, status, job security etc. These factors must be fair or considered as being fair.

Satisfiers relate to what an employee does whereas dissatisfiers compare the environment in which he does it. When the satisfiers fall below an acceptable level, they cause dissatisfaction, but when at or above the acceptable level, dissatisfaction is removed, which leads to a neutral state, not satisfaction. The satisfiers when present lead to happiness, higher productivity, and a source of higher level of motivation, but when this is absent, it produces dissatisfaction.

Critical Analysis of Frederick Herzberg's Two - Factor Theory

One of the limitations of this study is that the methodology does not take into consideration the impression that when employee's work is going on smoothly, they tend to look at the joy they derive from their job. In addition, the theory tends to believe that there is a strong relationship between productivity and job satisfaction. The best method of applying this theory is to take away the dissatisfaction and encourage the employee to find satisfaction.

The impact of this theory is that, to ensure higher productivity, the work should be made more interesting and less routine. Managers should ensure and encourage the presence of satisfiers to create room for maximum job performance. Hygiene factors prevent dissatisfiers but do not induce workers toward extra effort and as such, employers should not attempt to motivate workers through reliance on hygiene factors but on high order needs. Only motivation factors can lead workers to perform as their manager desires. [10] criticised this theory as an over-simplification of the relationship between motivation and satisfaction, as well as the cause of job satisfaction, and dissatisfaction. But significantly, the theory separates motivators and hygiene factors.

Conclusively, the various theories reviewed have their different perspectives to motivation though emphasise similar sets of relationships. Dealing with the problem and source of employee, motivation represents a potential tool for achieving necessary industrial and social objectives by way of increased productivity. This is because the whole noise and contention about motivation buoys down to how to get the worker to increase his performance to ensure increased productivity thereby achieving the goal of his organisation.

Process Theories of Motivation

In contrast to the content theories, the process theories concentrate more on how motivation occurs which includes how behaviour is directed, initiated, and sustained/stopped. This theory addressed the mechanism by which the needs of a human being changes.

Victor Vroom's Expectancy Theory

In this theory, motivation is driven by what the individual expects in the preferred outcome and the strength of the attractiveness of that outcome. [11] opined that effective motivation is a function of three major factors, thus:

A strong desire to attain a goal. A perception that if one works hard, he will accomplish that goal. A perception that one can influence his productivity level.

The above factors are determinants of an individual's productivity level. The perceived

ability to influence one's own productivity level is hinged on motivation.

Limitation of Victor Vroom's Expectancy Theory

This theory does not give an insight to the different levels of efforts put in by the employees. For example, an employee might be working day and night to increase the productivity of the organisation, the Vrooms theory does not explain the effort that the employee has put to achieve the result. [7] as one of the critics claimed that the theory is too simple and there is an assumption that when the management makes a financial bonus or reward, employees tend to increase their productivity to get this reward.

Secondly, this theory believes that reward will encourage a worker to put in greater efforts to enable him to obtain the reward, but it does not consider that the reward might also have a negative effect on the employee. For example, an increase in staff salary will lead to an increase in tax bracket. The outcome of this is that the reward or increase in salary will not be appreciated by those that are receiving it.

Goal Theory

The most important part of this theory is that individual goal determines behaviour. Employees strive to achieve these goals to satisfy their desires and emotion. This gave rise to the achievement motivation which determines the pursuit and attainment of goals. An employee that has the achievement motivation will want to achieve its goal and move up on the success ladder, realising its goal is more important than the reward that goes with it.

[12] purported the achievement theory of motivation where he differentiates three types of goals which are: the Mastery goals that focus on gaining competence or getting used to a new set of skills.

Ego involvement goals which have emphasis on achieving normative based standards. Social goals which involve relationships among people.

Limitation of This Theory

In this theory, it is seen that the theorist did not consider the implication of having an unhealthy competition. The major focus of staff in this theory is the motive involve in achieving the goals and not the goal itself. Staff focus will be to achieve more than other colleagues even if it means them taking a less tedious task. To achieve this, the staff should be encouraged to set their goals, the method or ways of achieving this goal and how to achieve this goal.

Intrinsic and Extrinsic Motivation

Intrinsic Motivation involves carrying out an activity for its inherent satisfaction rather than for some discrete consequence. When one acts in his inherent interests he grows in knowledge and skills. An employee that is intrinsically motivated will work for the fun or challenge involve rather than for reward or external pressures. Intrinsic Motivation happens within the individuals and in relation to their activities. Some employees in Onyix and Company Nigeria Limited are intrinsically motivated differently; some believe that motivation is based on an interesting task while others see it in terms of the satisfaction, they gain from being engaged in a task. [13] opined that the intrinsic motivation is given to an individual by himself for good performance while the extrinsic motivation is given by the organisation and meet mainly lower-order needs. [14] also supported the intrinsic motivation by maintaining that all behaviours are motivated by reward, but [15] has a contrary opinion to this, by asserting that behaviours are motivated by psychological drives.

In contrast to Intrinsic Motivation, Extrinsic Motivation refers to carrying out an activity for its instrumental value rather than for pleasure derived from the activity. For example, an employee will choose to perform his duties for fear of being penalised by his superior; this

shows that the staff is extrinsically motivated because he is doing this to avoid being given a query.

Motivation and Productivity

The discussion of the twin concept of Motivation and Productivity is intended to examine how workers can be motivated or induced to achieve increased productivity in the organisation. It is well known that employees are the most valuable assets of an organisation.

Every organisation is a producing machine because it is goal oriented. In other words, every organisation is established with a purpose/goal in view. It is the desire to achieve or accomplish the organisation's goal of Onyix and Company Nigeria Limited that necessitated the employment of workers and the production processes rely and depend on the human skills, knowledge, time, and efforts, hence the need for human motivation.

This is more-so, since, irrespective of its capital-know-how, the organisation depends on its human resources, the more satisfied the employers are and the more readily the organisation identifies and satisfies the employee's needs, the more willing the employees are to put in efforts that get the job done.

Workers ostensibly join the organisations to advance and contribute to the realisation of the organisation's goals, but they primarily come to the workplace with their personal needs and aspirations. These personal needs and aspirations determine their attitude to work. Worker productivity is a function, largely, of how much the needs brought to the workplace are satisfied by the organisation.

It is pertinent here to explain and define the term productivity. As mentioned above, every organisation is a producing machine. To be productive is an evaluative term. It presupposes a target to be met or a goal to be achieved or accomplished. For these goals to be realised, the organisation must create a conducive atmosphere where employees could achieve their own objectives effectively by directing their efforts towards the success of such organisation. [16] supported this view and opined that this could be achievable through decentralisation and delegation, Job enlargement, participatory management, counselling, and consultative leadership.

The term productivity is yet to receive a settled judgement in academic's discourse. People and groups conceptualise productivity based on their orientation and interest. The American Management Association defines it as a relationship between input and output – a measure of the degree of efficiency with which resources of all kinds are transformed into goods. This is an economist perspective of productivity. Its concern is production efficiency, which measures the ratio between input and output. It considers the final output of a system when compared with the input employed. [17] adopted this perspective by stating that productivity is a measure of how well inputs (manpower, machines, materials, money, time, space, information, and other resources) are transformed into output (finished goods and services).

This approach confuses efficiency with productivity. This is because efficiency has to do with the rational, economic use of resources, which may or may not reach/achieve the goal/target of the organisation. In this regard, productivity is viewed as a measure of degree of success attained in the accomplishment of a set target. This is because we cannot talk of productivity without having a destination or target in view. So, an organisation is productive to the extent it is able to accomplish a set target.

Any talk about productivity will remain futile without reference to human efforts. This is because all the activities of any enterprise are initiated and determined by the persons who make up the institution. Plants, offices, computers, automated equipment and all else that a modern firm use are unproductive except for human efforts and direction.

The above goes to suggest that productivity in any organisation depends largely on the human elements because they give directions to the organisation. The employment of people in any organisation is not an act of charity, but a rational decision based on the assumed potential of the human elements to contribute to the attainment of the goal of the organisation.

The human is a special resource in the organisation. It is the only resource that can think, feel, and act in a complex interrelated and interdependent system. To get the human being to move material, machine, and other resources, he must be motivated. This is supported [18] when he said that human resource in an organisation contributes to the sustainability of the competitive advantages of a company when the required strategic resources are satisfied. High performing work practices results in turnover in productivity which can be attributed to motivating staff, developing their skill and improving organisational structures which provides the workers with the means to control how they perform their roles. In analysing this you will see that these variables will increase the discretional efforts of the workers and enable them to perform better. This is supported by [19] that purported that an organisation that is performing depends on high employee motivation that has the right skill, the right role and a good understanding of the role.

At this juncture, the study is intended to examine these variable factors relative to Onyix and Company Nigeria Limited work milieu. This is premised on the supposition that the basic aim of motivational techniques employed by the organisation is to elicit from its workers more efforts towards increased productivity.

Strategies for Motivating Organisation Members

Organisations or Managers have various strategies for motivating organisation members. These strategies contain general guidelines of what managers can do to ensure that organisation members satisfy their needs through the performance of their appropriate organisation member's behaviour. These managerial strategies are:

1. Managerial communication.
2. Behaviour modification.
3. Job design.

Managerial Communication: One of the basic motivation strategies for managers is simply to communicate effectively and efficiently with organisation members. As a result of this communication with managers, organisation members can satisfy the basic human needs as recognition, a sense of belonging and security. For example, a communication message from a manager to a subordinate appreciating him for a job when done can help to satisfy recognition and security needs of the sub-ordinate. This could also be reversed negatively.

Behaviour Modification: Behaviour modification is a behavioural change therapy that decreases or increases the frequency of behaviour, it also encourages appropriate behaviour because of the effect of that behaviour. According to the law of effect, [20] behaviour that is rewarded tends to be repeated, while behaviour that is punished tends to be eliminated. Rewards and punishment are involved in behaviour modification processes. Rewards are basically emphasised service they have more effective influence on behaviour than punishment.

Behaviour modification in performing one's job involves the use of positive reinforcement to change behaviour. For this to achieved, performance audit will be conducted first, to establish the behaviour that should be modified, thereafter a set guideline of positive reinforcement is introduced to reward employees with the desired behaviour. Punishment which is seen as negative reinforcement is rarely used, knowing that positive reinforcement improves workers' productivity and behaviour.

Behaviour outcome should be followed immediately with reward either positive or negative to reinforce behaviour. Positive reinforcement is a desirable consequence of behaviour, while negative reinforcement is the elimination of an undesirable consequence of behaviour.

The success of this approach depends on the managerial skill of a manager.

1. The manager should endeavour to inform the subordinate about the relationship between various behaviours and the consequences associated with them. He should also give different levels of rewards to different workers depending on the quality of their performance.
2. Telling workers that they are doing wrong.
3. Punishing workers privately so as not to embarrass them in front of others and,
4. Always giving rewards and punishment when earned to emphasise that management is serious about behaviour modification [21].

Job Design Strategies: This entails work simplification and specialisation aimed at increasing worker's productivity. Although boredom and dissatisfaction may set in as the work becomes simpler and more specialised. As a result, productivity suffers. To overcome this, job boredom, job rotation and job enlargement could be introduced.

Job Rotation involves moving workers from job to job or not requiring worker to perform only one single and specialised task over a long period. This has helped to increase organisational productivity in a short run. In contrary, Job Enlargement is a strategy developed to overcome the boredom of simple and specialised tasks. Job enlargement increases job satisfaction than job rotation.

Work Environment

A conducive work environment forms the basis in which the hypotheses were developed. The work environs refer to the job. The job context encompasses company policy and administration, technical supervision, salary, interpersonal relationship with the supervisors, and working conditions. This could be a source of satisfaction or dissatisfaction.

Many scholars and experts are of the belief that workers' behaviour is a function of their environment. An individual perception about his environment has a great deal to do with whether he will be bold or meek, optimistic, or pessimistic within the company he finds himself. This was supported by [22] where he purported that a worker external environment can influence not only his personality but also his perception, all of which affect his attitude and behaviour within the organisation.

The implication of the above is that positive work environment affects the behaviour of the workers positively hence his productivity. The management of Onyix and Company Nigeria Limited seems to agree with this, hence the efforts they make to review the working conditions periodically in a bid to elicit positive behaviour from the staff. [9] in his 2-factor theory disagrees with the above. He believes that satisfiers/motivators relate to the work content while dissatisfaction relates to the work context, that is, salary, company policy, working conditions etc. which are instrumental factors, do not motivate when they are present, but when absent, they lead to dissatisfaction.

Materials and Methods

Data Collection and Sample

In this study, the primary data was obtained using the questionnaire. It helped in the gathering of data on practices, situations, or view. A descriptive cross-sectional study was carried out to seek solutions to the problem in this study. A quantitative structured approach was used to collect information relating to motivation and productivity, so that an in-depth description on the numerical information can be generated and emphasized.

The population of this study consists of 450 staff in the five division of Onyix and Company Nigeria Limited. In order to achieve the

objectives of the study, an unbiased sample was used to ensure that every employee in the population has an equal chance of selection hence a random sampling method was employed to select 100 employees from a population of 450 staff out of which 90 respondents submitted their feedback and this constituted the sample size of this study while tabular and statistical technique were used to analyze the data and gather the findings.

A standard questionnaire with structured questions written in English Language was used in the collection of data. It contains twenty-one multiple choice questions from which the respondent can choose the most suitable. This choice was deliberate because they contain information on all the variables included in this study, it provides suitable respond structure for this process and will allow statistical method to be used in analysing the data collected so it can aid in the research hypothesis testing. The questionnaire was designed and patterned along [2] Five-point scale model, that is 1 = Strongly disagree, 2 = disagree, 3 = Not sure, 4 = Agree and 5 = Strongly Agree.

Test of Reliability

A pilot test was carried out with 20 numbers of the respondents that broadly represent 2% of the overall staff that will be used in this study. A draft of the questionnaire was done to test if it will achieve its desired results and to correct any mistake that could be identified. At the end of the pre-testing the questionnaire, it was observed that the questions are too worded, the sequence of the question was not place in the right order and the instructions to the interviewers were inadequate. It was based on the successful outcome of the pre-test that the final form of the questions and the questionnaires were developed.

Method of Data Analysis

In the study under review, the data collected are the responses from respondent that were administered the questionnaires. The data was collected, collated, analysed, and interpreted. In a bid to underline the cause(s) of this problem with a view to finding a lasting solution to the problem, the formulated hypotheses will be tested using some questions in the distributed questionnaires. Inferential statistics was used to analyse the data collected from the respondent and to test the relationship between staff motivation and productivity, eight (8) questions out of the twenty-three (23) questions in the questionnaires were selected because they have direct effect on the study under review and these questions and the responses were analysed using the Statistical Package for Social Sciences to analyse the Pearson Product Moment Correlation Coefficient to find out if there is a relationship between motivation (x) and staff productivity (y) and how positively or negatively correlated are they while the Chi Square was used to analyze the stated hypotheses.

In carrying out the coding, the response to questions in the questionnaire was set as X and Y.

Where, X signifies Agree and Strongly Agreed.

Y signifies Not Agreed and Disagreed.

The total number of X and Y were counted for each of the eight questions and used to carry out the coding and the analysis of the responses. Each questionnaire and their corresponding scaling were grouped into a range of 10 respondents for the ninety (90) returned questionnaires for easy management and collation into X and Y.

The selected questions were.

1. Question 1: How do you assess your salary vis-à-vis what obtains in the industry?
2. Question 2: How do you assess the state of productivity in your company?
3. Question 3: How do you assess the condition of service in your company?
4. Question 5: How do you assess these fringe benefits?
5. Question 9: Do you feel satisfied working in this company?

6. Question 12: Would you like to make a career in this company?
7. Question 13: How do you assess the morale of workers in your company?
8. Question 18: How is your relationship with your supervisor?

Data Presentation and Analysis

The presentation starts with the demographic data, the quantitative results, the test of hypothesis and the discussion of the findings.

Demographic Data

The socio-demographic data was used to get the characteristics of the ninety staff of Onyix and Company Nigeria Limited that participated in the survey, a response rate of 90 percent was completed and is appropriate to conduct the analysis.

Table 1. Respondents' Response to the Questionnaire

Criteria	Frequency	Percentage Response
Gender		
Female	48	53.3
Male	42	46.7
Age		
18 - 25	15	16.7
26 – 35 years	24	26.7
36 – 45 years	37	41.0
46 and above	14	15.6
Marital Status		
Divorce	4	4.4
Married	40	44.4
Separated	7	7.8
Single	39	43.4
Length of Service		
0 – 5	20	22.2
6 – 10	29	32.2
11 – 15	26	28.9
16 >	15	16.7

Descriptive Statistics

This Table 2 the Mean, Standard Deviation, and the number of the Observations for each of the variables (N).

Correlation Analysis

This section gives the value of the specified test of correlation i.e., Pearson's r. Each row and column correspond to one of the variables each in the Table 3.

Table 2. Mean Score Analysis

	Mean	Std. Deviation	N
x	36.13	11.395	8
y	47.00	11.539	8

Table 3. Correlation

Correlations		X	Y
x	Pearson Correlation (r)	1	-1.000(**)
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	908.875	-920.000
	Covariance	129.839	-131.429
	N	8	8
y	Pearson Correlation (r)	-1.000(**)	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	-920.000	932.000
	Covariance	-131.429	133.143
	N	8	8

** Correlation is significant at the 0.01 level (2-tailed)

Table 4. Nonparametric Correlations

Correlations			X	y
Kendall's tau_b	X	Correlation Coefficient	1.000	-.982(**)
		Sig. (2-tailed)	.	.001
		N	8	8
	Y	Correlation Coefficient	-.982(**)	1.000
		Sig. (2-tailed)	.001	.
		N	8	8
Spearman's rho	X	Correlation Coefficient	1.000	-.994(**)
		Sig. (2-tailed)	.	.000
		N	8	8
	Y	Correlation Coefficient	-.994(**)	1.000
		Sig. (2-tailed)	.000	.
		N	8	8

** Correlation is significant at the 0.01 level (2-tailed)

Table 5. Regression

Variables Entered/Removed (b)			
Model	Variables Entered	Variables Removed	Method
1	x(a)	.	Enter

a All requested variables entered. b Dependent Variable: y

Table 6. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.999(a)	.998	.998	.515

a Predictors: (Constant), x

Table 7. ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	978.406	1	978.406	3683.462	.000(a)
	Residual	1.594	6	.266		
	Total	980.000	7			

a Predictors: (Constant), x; b Dependent Variable: y

Table 8. Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	84.481	.644		131.204	.000
	X	-1.038	.017	-.999	-60.692	.000

a Dependent Variable: y

Testing of the Hypothesis

Hypothesis shows a tentative prediction of the answer or explanation of the research problem being investigated. The tentative explanations are developed temporary at an early stage of a research, and they give an insight to the research being studied, and thy must be put to test to see if they conform to the direction of the research and proffer solution to the problem being studied. The assumptions may be believed to be true, but the result of the research may proof to be otherwise.

Three hypotheses were set in this study and will be tested to see if they are validated or not validated. Some of the answer from the questionnaire will be used to validate this.

The test will be carried out using the statistical test type called the Chi-square denoted by (X2). The Chi Square will measure the relationship between the dependent and independent variables.

The formular for calculating the Chi-square (X2)

(X2) = (Oi – ei) 2 + (O2 – e2) 2 + (On – en) 2 ei e2 en.

Where:

Oi = Observed frequency.

ei = Expected frequency (Total observed value divided by the number of alternative responses).

On = Number of Observed frequency that occurred.

en = Number of expected frequency that occurred.

Testing Hypothesis 1

Null Hypothesis (H0): Higher monetary incentive to workers will not lead to increase in organisation's productivity.

Question 8 in the questionnaire was designed for testing of this hypothesis as illustrated in the Table 9.

Table 9. Testing Hypothesis 1

Responses	Oi	ei	Oi - ei	(Oi – ei)2	(Oi – ei)2 ei
Prospect of promotion	18	18	0	0	0
Good fringe benefits	14	18	-4	16	0.89
Good work environment	17	18	-1	1	0.06
Good salary	30	18	12	144	8
Prospect of job security	11	18	-7	49	2.72

Using the Chi-square method in calculating this;

X2 = (Oi – ei) 2 + (O2 – e2) 2 + (On – en) 2

ei e2 en = 11.67.

The calculated X2 = 11.67.

The degree of freedom = K – 1, where k is the number of rows.

K = 5.

Therefore, K – 1 = 5 – 1 = 4.

Using the Chi-square distribution table from Biometrika table for statistician, the critical value of X2 0.05 at 4 degree of freedom is 9.488.

Decision Rule

At a significant level of 5% accept the null hypothesis if the calculated value is less than the table value, otherwise, reject the hypothesis if the calculated value is greater than the table value.

Following the calculation above, the calculated value for the Chi Square is 11.67 which is greater than the tabulated value 9.488. This means that the test result falls out of the acceptable region hence the alternative hypothesis that says that higher monetary incentive to workers will lead to increase in organisation's productivity is accepted and the null hypothesis is rejected.

Testing Hypothesis 2

Null Hypothesis (H0): The extent to which an organisation succeeds in satisfying the needs of its staff will not determine the degree in which the goals of the organisation are realised.

Question 20 in the questionnaire was designed for testing of this hypothesis.

Table 10. Testing Hypothesis 2

Responses	**Oi**	**Ei**	**Oi – ei**	**(Oi – ei)2**	**(Oi – ei)2 ei**
Agreed	29	30	-1	1	0.03
Disagreed	45	30	15	225	7.50
Can't Say	16	30	-14	196	6.53

X2 = (Oi – ei) 2 + (O2 – e2) 2 + (On – en) 2.

ei e2 en = 14.06.

The calculated X2 = 14.06.

The critical value of X2 0.05 at 2 degree of freedom is 5.991.

Decision Rule

In the above calculation, the calculated value which is 14.06 is greater than the tabulated value of 5.991 at 2 degrees of freedom. This means that the test result falls out of the acceptable region hence the alternative hypothesis that says that the extent to which an organisation succeeds in satisfying the needs of its staff will determine the degree in which the goals of the organisation are realised is accepted and the null hypothesis is rejected.

Testing Hypothesis 3

Null Hypothesis (H0): The productivity of workers will not decline when the climate in the organisation is hostile than when it is friendly.

Question 17 in the questionnaire was designed for testing of this hypothesis and is analysed in the table below.

Table 11. Testing Hypothesis 3

Responses	**Oi**	**Ei**	**Oi – ei**	**(Oi – ei)2**	**(Oi – ei)2 Ei**
Cordial	22	30	-8	64	2.13
Not Cordial	45	30	15	225	7.50
Moderate	23	30	-7	49	1.63

X2 = (Oi – ei) 2 + (O2 – e2) 2 + (On – en) 2
ei e2 en = 11.26.

The calculated X2 = 11.26.

The critical value of X2 0.05 at 2 degree of freedom is 5.991.

Decision Rule

In compliance with the decision rule, the calculated Chi Square value which is 11.06 is greater than the tabulated value 5.991 at .2 degree of freedom. This means that the test result falls outside of the acceptable region hence the hypothesis that says that the productivity of workers will decline when the climate in the organisation is hostile than when it is friendly is invariably accepted.

Result and Discussion

As shown in Table 1, In the sample of 90 respondents, 42 are male and 48 are female with the male constituting 46.7% of the respondents and the female 53.3%. More female took part in the survey than the male. 15 respondents are between the ages of 18 – 25 which is 16.7%, 24 between the ages 26 – 35 which is 26.7%, 37 are between the ages 36 – 45 which is 41% and 14 respondents are between 46 and above which is 15.6%. We have more employees between the age bracket of 36 – 45 years of age. 4.4% of the respondents (4) are Divorced, 40 Married which is 44.4%, 7 are Separated which is 7.8% and 39 respondents are Single which forms 43.4%, the organization has more married employees and single employees follow next. In addition, 20 respondents have been with the company between 0 – 5 years which forms 22.2%, 32.2% are between 6 – 10 years, 26 respondents between 11 – 15 years which represent 28.9% and 15 respondents have worked 16 years and above which is 16.7%. Staff that have worked between 6 – 10 years in the organization had the highest response and are experience as well to give objective feedback.

It is seen from table 3 that there is correction between motivation and staff productivity. The correlation value (r) is -1 which means there is a high correlation between motivation and productivity. Strong relationship between workers motivation and productivity exists which show that the more workers are motivated the higher their productivity.

In the model summary indicated in table no 6, the R square value is 0.998 that is 99.8%, which means there is likely 99.8% changes in the dependent variables are caused by changes in the independent variable.

The result of the Anova analysis in table 7 showed that the p-value is 0.00 which is less than 0.05, so, there is a significant relationship between the dependent and the independent variable, hence the control variable and the factor is fit for consideration.

The first hypothesis which says that the higher monetary incentive that workers get increases the productivity of the organisation. Going by the outcome of the statistical test carried out in order to find out if there is a significant relationship between higher incentive and productivity, it is seen that the higher monetary incentive is a major determinant in the increase of productivity subsequently the hypothesis was accepted and the assumption of high incentive having influence on productivity is supported by [23] in his Principle of Scientific Management which noted that workers when paid adequate wage or given higher monetary incentive tend to work harder, thereby increasing their productivity. The poor wage/salary/poor incentive purportedly paid to workers in the company undoubtedly affects their productivity. This supports the above hypothesis.

In support of the above, money is a good motivator of behaviour in a work context, and workers respond to it more than any other factor. They tend to view money as a good inducement that will motivate them in ensuring that the goals and the objectives of the organisation are met. This contradicts [9] hygiene factor which holds that salary/money

does not motivate worker to higher efforts but only help to keep workers on the job. It supports Taylor's assertion that productivity could be increased by giving workers or employees' higher pay and higher incentives.

On the strength of the acceptance of the second hypothesis which states that the extent to which an organisation succeeds in satisfying the needs of its staff determines the degree in which the goals of the organisation are realized, it is clear that the needs and aspirations of workers are far from being met, hence this validated the hypothesis.

In a situation whereby workers are rarely promoted, salary and conditions of service poor, and morale low, productivity is bound to be low. When the needs of the employees are not met, this will lead to demotivation which is contagious. A demotivated worker that constantly complain about the condition of service or other undesirable factors can easily tend to work on other staff to be demotivated as well. For any organisation to tackle demotivation effectively, then it is necessary to determine the reason behind the lackluster attitude of the workers. If the management can help to motivate such workers, it will go a long way to boast the morale of the workers and motivate them to be open, optimistic, and also have a positive attitude. A demoralized workforce can make or mare an organisation.

Hypothesis 3 is aimed at evaluating the environment under which the employees work, and its impact is on productivity. This is because the environment and organizational climate can be a motivator or de-motivator. An unfriendly work environment can cause a decrease in worker's productivity; it is necessary and imperative to build an environment that can promote respective behaviour amongst employees.

It stated that when the organizational climate is hostile and unfriendly, the productivity of workers declines. This has been tested and validated based on the result of the calculated and critical value. The above sum up to paint a picture of an unfriendly organizational climate in the company. This gives impetus to the not too encouraging productivity level in the organisation, thereby validating the stated hypothesis 3. This situation can be corrected if the management can make out time to listen to what is said and unsaid by the employee and get involved. In an organisation, body language can speak volume about the organization's atmosphere; hostile environment must be corrected so that the productivity of the organisation is not adversely impacted negatively. Identification of the ramifying problems and error inherent and emanating from motivation in Onyix and Company Nigeria Limited must be addressed, and a solution proffered that is aimed at ameliorating or obliterating the problems must be sought so that productivity will not be adversely affected. The organization's climate must be always friendly so that the employees feel free and safe to communication with the management on issues affecting their productivity.

Conclusion

From the study, it was observed that productivity is a functional part of the employee's ability and their motivation, so if productivity equals to zero so does employee motivation. The primary task of the management is to motivate workers to put in the best of their ability.

Motivation forms an internal engine of an organisation, and its benefit cannot be quantified as it shows over a period. The ultimate reward of motivation is employee's personal growth and development, an employee is motivated when he is given a challenging work in which he can assume responsibility.

The employees are life wire of an organisation and when they are motivated it will have an adverse effect on productivity and if they are not motivated, it will negatively affect the overall efficiency and productivity of the organisation. [24] suggested three basic

types of behaviour necessary for every organisation to function effectively, namely:

1. People must be induced to enter into and remain within the system.
2. Employees must carry out their role assignments in a responsible and dependable fashion.
3. There must be innovative and spontaneous activities in achieving the objectives of the organisation far beyond the routine role definition and specification.

In this study, the investigation highlighted the following salient points within the organisation. Low worker morale is responsible for the declining performance and productivity of workers in the organisation. This low staff morale is attributable to the poor conditions of service, poor incentives scheme, poor salary, lack of opportunity for career advancement, poor worker–management relations, poor supervisor relations and management nonchalance to the welfare of the staff. Low morale of a workforce is very contagious and can be like a plague that spreads from one worker to the other. The management of Onyix and Company Nigeria Limited must does not ignore this because it can have devastating effect on the growth and productivity of the organisation.

It is therefore the duty of the management to understand the needs and aspirations which workers brought to the workplace and to tailor their motivational scheme towards these needs and aspirations. This can be achieved through careful study of the workers, careful analysis of the micro and macro-economic trends and the alignment of the conditions of services and welfare packages to the trend in the economy, and a proper appraisal of workers with a view to weeding nonperforming staff and bad eggs in the organisation. A manager should be aware that a management style also influences motivation because if a manager is not appreciated or liked by the employee this will make the workers to function minimally. It is advisable for managers to undergo training and workshops that will educate them that the emotion of the employees is also involved in motivation. An employee may be unstable to perform optimally if he is easily emotional about situations. Under a normal situation and conditions, employees tend to work at about two thirds of their capacity. In addition, when employees are properly motivated there will be a direct association with productivity and with maintenance factors. This is evident, when there is less staff turnover, absenteeism is reduced, workers are contented with their work, they feel challenged and are less destructive in carrying out their job function, therefore the result will lead to higher level of productivity and the survival of the organisation is ensured.

Furthermore, for a manager to be successful, he must be a people mover, so his attitude motivates employees to increase productivity. He should ensure that he knows his workers and understand that employees are from different background and environment, so they do things for different reason and motives, if this is not recognised quickly, the manager will lose some of his best staff.

The stereo-type application of motivational strategies as is the case in most of our organisations should be eschewed. In motivating workers to be effective it must be relevant to the needs and the aspirations of workers else it will be fruitless and useless.

If the above are objectively and sincerely carried out, no doubt, workers confidence and loyalty to the company will be firmly established thereby enhancing their productivity and ensuring the survival of the organisation.

Recommendation

In view of the proliferation in the industry and the heightened competition engendered, it becomes more imperative that any organisation that get its workers to work harder and show more commitment to their work will thereby increase their productivity. The survival and existence of the organisation depends on the higher productivity of the company and so

management should ensure that the staffs are adequately motivated to ensure higher productivity. It is against this backdrop that the management of Onyix and Company Nigeria Limited incessantly prod their workers to re-double their efforts thereby enhancing their productivity, but the obvious low morale of the workers/staff has not helped the productivity situation. Based on data collected on the factor that workers feeling could elicit their optimum exertion of efforts toward the realization of the organisational goal, the following factors are discernible.

1. Good Salary: The salary should be very competitive in the industry and good enough to provide at least the worker's basic needs. In this regard, any salary enhancement or monetary inducement should take into cognisance the cost-of-living index and the inflationary trend. This investigation reveals that Onyix and Company Nigeria Limited merely fix the salary of workers, determine the conditions of service, establish incentive schemes without considering the needs and aspirations of the workers.
2. Opportunity for career advancement: A well-structured organogram or policy should be put in place towards career advancement. The structure should be such that it allows the workers to develop their potential, advancement in their career and can even rise to top management position. This will enable the worker have confidence in the system and themselves and stay longer in the organisation thereby reducing staff turnover.
3. Improve general working conditions: The Company should provide the right working tools, create good corporate image both for the staff and the organisation. There should be a clearly spelt out division of labour and the right tool/safety for the job should be provided to the job holder. The worker should be properly trained as this develops them mentally and physically on the job.
4. Conducive organisational climate: A friendly work environment should be created through frequent social visit, attending colleague's marriage celebration, childbirth visitation, condolence visitation to a bereaved colleague, group get – together, annual party, club membership, group picnic, retreat, seminars etc. Poor worker–management relations, hostile organisational climate, favouritism, and victimisation are the bane of workers dedication, hardworking and commitment to work/duty. A conducive and stable organisation climate should be built and encouraged. This is possible when workers are also involved in decision making in things concerning their welfare and the organisation, their concerns or issues are listened to and very well addressed. Justice and equity should be the watch word for the management and should also be enthroned while favouritism is eschewed, promotion should be based on merit and not on personal recognition.
5. Productivity bargain: This is another good means of increasing productivity through motivation. The management and the workers can agree at a certain realistic set target which are achievable, and management will agree to give a certain percentage of the proceed if the set target is met. This could be perceived from the Management by Objective (MBO) point of view which according to [25] productivity increases when goals are set, participation in decision making are carried out and feedback are given objectively. When all these processes are combined, MBO also should increase productivity.
6. Shareholding: Management should make it possible for their workers to have a stake in the organisation through having some share in the company. This will make them to have a sense of belonging and a great sense of responsibility towards discharging the company's obligation.

7. Good gratuity and pension scheme: When gratuity and pension scheme are not present or adequate in an organisation, the workers will perceive the company as a stopover or just buying time while in transit for juicy or greener pasture. When pension scheme is put in place the workers are assured of a means of living after retirement, so they would do anything to protect the survival of the organisation since they also have a stake in the company and any failure affects their lives.

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Conflict of Interest Statement

I declare that there is no conflict of interest in this study.

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Sustainability of Donor Funded HIV Prevention, Care, and Treatment Programs for Key Populations in Nigeria

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Abstract

Overseas development assistance (ODA) for HIV from bilateral donors other then the US has fallen 57% in the last decade. HIV responses in low- and middle-income countries is $8 billion short for 2025. Donors want national governments to gradually take over HIV responses to maintain program gains and investments. Programs with greater sustainability capacity can maintain positive outcomes and benefits over time. We examine Nigeria's donor funded KP HIV program for sustainability. A mixed-methods approach using Washington University Program Sustainability Assessment Tool (PSAT) to survey perspectives of key informants from HIV stakeholders. Overall and domain mean scores and standard deviation determined, and quantitative analysis conducted using IBM Statistical Package for the Social Sciences (SPSS) version 28. Thematic analysis was applied to open-ended questions from key informant interviews. A total of 24 consenting respondents participated. Overall mean sustainability score was 4.72. Highest mean scoring domains were program adaptation (5.6) and program evaluation (5.59), lowest means scores were partnerships (3.17) and funding stability (3.56). Sociocultural and political contexts hinder strategic behavioral change communication to promote KP and quality services. Suboptimal political support, funding insecurity, limited partnerships, and donor-driven strategic planning cycles threaten the program's sustainability.

Keywords*: HIV, Key Populations, Program Sustainability.*

Introduction

HIV remains a global health threat despite concerted efforts to control the epidemic over the past 3 decades. This threat has escalated over the past 2 years as the Covid-19 pandemic, combined with declining funding for global HIV response has limited access to life-saving HIV prevention, care, and treatment services globally [1]. In 2021, there were 38.4 million people living with HIV globally, with 1.5 million new infections and 650,000 AIDS-related deaths [2]. HIV is also widening inequalities within and between countries while stalling the HIV response. Countries in sub-Saharan Africa (SSA) continue to be most affected by the HIV/AIDS epidemic as 67% (25.6 million) of PLHIVs reside in the region, with 5 million of these PLHIVs resident in West and Central Africa (WCA). Nigeria, the most populous nation in WCA, bears the highest burden of HIV in the region (3rd

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highest in sub-Saharan Africa) with an estimated 1.9 million PLHIV and a HIV prevalence of 1.4% in the adult population [3]. HIV disproportionately affects some sub-populations referred to as key populations (KP). Key populations include gay men and other men who have sex with men (MSM), sex workers (SW) and their clients, people who inject drugs (PWID), transgender people (TG) and people in closed and custodial settings (PICC). HIV is more prevalent in this high-risk population because of high-risk sexual, unprotected penile-anal sex and with multiple sexual partnering or substance use behaviors that make them more susceptible to HIV infection. Among Sex Workers (SW), occupational demands of having multiple sexual partners on daily basis, becoming riskier where some clients offer to increase their fare for unprotected sex which throws off the conversation around condom negotiations.

In 2021, 70% of new HIV infections globally occurred among KP, while 54% of new infections were among KPs in sub-Saharan Africa [4]. KPs experience higher risk for HIV with PWID, female SW, MSM and TG women respectively having 35, 30, 28 and 14 times the risk of their counterparts in the general population. These increased risks are reflected among KPs in Nigeria as estimates suggest the HIV prevalence among MSM (25%), brothel-based female SW (17.1%), non-brothel based female SW (15%), and PWID (10.9%), is significantly higher than the prevalence in the general population at 1.4% [5]. The increased risk may in part be explained by the relatively lower uptake of essential health services including HIV services among KPs due to marginalization, stigma, and human rights violations [6].

The Global Coalition's Road map to reducing new infections by 75% by 2020 continues to face challenges with high HIV incidence and low prevention and treatment coverage among KPs despite efforts to make these services more accessible especially in the last decade. The new coalition expands on the HIV Prevention 2020 Road Map and addresses the inequalities that slow progress. It considers an evolving context of persistent inequalities and overlapping pandemics, economic challenges, shrinking civil society space, and human rights erosion [7]. Nigeria's HIV epidemic is more aptly described as a mixed epidemic with concentrated foci among KPs [5] which also threatens progress made by the HIV control program more generally.

Nigeria's HIV prevention, care, and treatment program has made significant progress in achieving the UNAIDS laid out 95-95-95 fast track targets to end the HIV epidemic by 2030 – "95–95–95 testing and treatment targets achieved within all subpopulations and age groups". These targets call for 95% of PLHIV to be diagnosed, 95% of all diagnosed PLHIV to be on sustained antiretroviral therapy (ART) and 95% of all PLHIV on ART to have viral suppression by 2025 By December 2021, the Nigerian program had identified 89% (approximately 1.77 million) of the estimated 1.9 million PLHIVs, 97% of whom were receiving ART and 95% of whom were virally suppressed [8]. The Nigeria HIV program is largely supported by international donors namely the US president's emergency plan for HIV/AID relief (PEPFAR) and the global fund to fight AIDS, tuberculosis, and malaria (GF-ATM) in strategic partnership with the government of Nigeria (GoN) in what is known as the National HIV Alignment Program. In 2021 the two donors contributed 98% (71% - PEPFAR and 27%-GF-ATM) of the reported $799 million in total HIV expenditures [8]. This donor-funded HIV program also supports delivery of tailored HIV prevention, care, and treatment services to KPs through One Stop Shops (OSS) (i.e., standalone service sites addressing the entire spectrum of HIV care while minimizing access barriers), integrated community ART services and government public health facilities. These services are fully funded by PEPFAR and GF-

ATM, with minimal integration of services like OSS with the rest of the health systems.

However, international donors have begun transitioning HIV control programs to country governments (as a form of sustainability strategy towards ownership) to continue their financing, management, and implementation. Sustainability being the ability to maintain programing and its benefits over time [9]. However, poor transitions can lead to financial shortages, medical product and supply stock-outs, service disruptions, and human resource shortages which affect program continuation and population health [10]. In 2013 for example, PEPFAR Nigeria transferred responsibility for the HIV response in Abia and Taraba states to the GoN. While the programs in these states were sustained through the Subsidy Reinvestment and Empowerment Program (SURE-P) scheme for over a year, its viability was threatened with the end of the SURE-P program in 2016 and reduction of funding to less than 10% of the requested budget in 2017 [11].

In the context of unreliable funding for HIV programs on transition, the sustainability of such HIV program in Nigeria especially for KPs must be closely considered to prevent a reversal of current gains and perhaps resurgence of the HIV epidemic. Moreover, Nigeria is slated for the next wave of program transition from donor support alongside Malaysia and Cambodia [12]. In other similar contexts, programs have achieved varied levels of sustainability upon transition. For example, while the program in China remained viable with robust continued technical support from the US government and UNAIDS, programs in Romania and Nigeria failed. In Romania, with only 1% of the HIV budget allocated to preventive services and even less for KPs, a lack of payment options for civil society organizations in a context of pervasive HIV stigma resulted in KP services not being covered by the Romanian government [12]. While other factors including the abruptness of the transition might account for some of these outcomes, a clear assessment of the sustainability of the Nigerian KP program is urgently required, given similarities between its context and other similar jurisdictions where transition failed.

Sustainability can be considered as a multifaceted process for ensuring long-term benefits of programs or interventions while maximizing limited resources, maintaining community support, and maintaining ethical standards. We define sustainability as the general continuation and maintenance of desired aspects of a program and its associated results and continued adaptation and development of the program in response to the system's evolving needs [13]. According to Schell , public health programs can only provide positive results if their actions are maintained throughout time referring to the ability of programs to do that as their "capacity for sustainability" [9]. Schell and colleagues define sustainability capability as the existence of structures and procedures that enable a program to effectively implement and maintain evidence-based policies and activities by leveraging resources. The authors identified 9 domains- (1) funding stability; (2) political support; (3) partnerships; (4) organizational capacity; (5) program adaptation; (6) program evaluation; (7) communications; (8) public health impact; and (9) strategic planning- which pertain to the ability of a program to continue its activities and benefits over time.

Country programs with partial or full donor support have been encouraged to plan for sustainability of their KP especially in contexts where governments are unwilling to support or fund them [12]. Further sustainability concerns exist for poorly integrated or often isolated parallel health systems for KPs, set up and operated without government support which could be disrupted during the transition process. Programs that have a greater capacity for sustainability may be better prepared when faced with threats of change, such as cuts in

funding, shifts in infrastructure, or even changes in leadership. It has been reported that approximately forty percent of new programs do not survive beyond the first few years following the conclusion of initial funding [9].

Therefore, this study aimed to assess the sustainability capacity of donor funded HIV prevention, care, and treatment programs for KPs in Nigeria while being implemented and to identify challenges and factors limiting their sustainability from the perspective of HIV prevention program managers, health professionals at OSSs for KPs and other stakeholders involved in the delivery of the program.

Materials and Methods

The study was conducted across Lagos and Kano states plus the Federal Capital Territory (FCT) in Nigeria. The Federal Republic of Nigeria is located in western Africa on the Gulf of Guinea and has a total land area of 923,768 km2. It is a Federal Republic comprised of 36 states and 774 local government areas. It has a population of 213,401,323 in 2021, with a distribution of 51.7% rural and 48.3% urban. Health care delivery is a shared responsibility between the three levels of government and the private sector, and the average life expectancy in Nigeria is 54.7 years.

This was a mixed-methods study. Key informants from HIV stakeholders familiar with the KP program and had influence, experience, and knowledge of the HIV program were surveyed between November 2022 to February 2023. Informants included government representatives at the state and national (FCT) levels, donors (United Nations, PEPFAR), PEPFAR implementing partners (IPs) and principal recipients (PR) of the Global Fund grant, the network of People Living with HIV (NEPWHAN), Country Coordinating Mechanism, and state-level community and religious leaders in Lagos and Kano states.

We recruited a convenient sample of consenting participants who had working knowledge and experience of the HIV program for KP and working in any of the 3 states. The survey was an adapted version of the Program Sustainability Assessment Tool (PSAT) which was developed by the Washington University, St. Louis, Missouri [14] and adapted by the Centre for Managing Chronic Disease, University of Michigan to include open-ended probes developed by evaluators. The PSAT, is a 40-item multiple-choice instrument [15] that evaluates a program's capacity for sustainability in 8 domains including political support, funding stability, partnerships, organizational capacity, program evaluation, program adaptation, communication, and strategic planning. Each domain is scored on a 7-point Likert scale, ranging from 1- “To little or no extent” to 7- “To a very great extent”. We further adapted the open-ended questions of the PSAT to be more specific to the Nigerian HIV KP program and transferred to an online program, Kobo Toolbox, and sent via emails. Recruitment emails with the attached guide for completing the tool and link for accessing the questionnaire were sent using program listservs for each of the states with consenting participants while for the one KI that wanted the questionnaire administered by a data collector, a date set for the interview was set and interview conducted. All surveys were conducted using Kobo Toolbox.

Simple descriptive statistics were used to summarize the data presenting mean scores and corresponding standard deviations for responses to items from the PSAT for each domain and the summary PSAT score. All quantitative analyses were completed using IBM Statistical Package for the Social Sciences (SPSS) version 28. For open-ended questions corresponding to each PSAT domain, we applied thematic analyses. One researcher coded participants’ response and discussed emergent themes with the rest of the team. Subsequently, emergent themes were identified, defined, and aligned with the domains of the sustainability framework guiding the study. Qualitative

analyses were conducted using QDA Miner [16].

Results

Respondents' Characteristics

Across Abuja, Lagos and Kano states, a total of 24 respondents consented to participate in the study, with 16 (66.7%) in Abuja, 8 (33.3%) representing donor organizations and 5 (20.8%) representing civil society organizations and 11 (45.8%) supporting community-based HIV programs and 11 (45.8%) supporting a mix of community- and facility-based HIV KP programs (Table 1).

Table 1. Respondents' Characteristics

Characteristics	N (%)
State	
Abuja	16 (66.7)
Kano	4 (16.7)
Lagos	3 (12.5)
Missing	1 (4.2)
Type of organization	
Civil society organization	5 (20.8)
Donor organization	8 (33.3)
Government of Nigeria	4 (16.7)
Non-governmental organization	5 (20.8)
Others	2 (8.3)
Site of operations	
Community	11 (45.8)
Community/Facility	11 (45.8)
Facility	2 (8.3)

Overall, the mean sustainability score for HIV KP programs was 4.72, SD: 1.48 (Table 2). In terms of the sustainability domains, mean scores in descending order were program adaptation (5.6, SD: 1.36), program evaluation (5.59, SD: 1.35), organizational capacity (5.37, SD: 1.40), communication (5.23, SD: 1.45), political support (4.81, SD: 1.52), strategic planning (4.44, SD: 1.67), funding stability (3.56, SD: 1.34) and partnerships (3.17, SD: 1.72). Regarding partnerships, the lowest scores were observed in sub-domains related to the engagement of local leaders from diverse organizations (government, private, non-profit and community organizations) in implementing program activities (3.14, SD:1.75) and the engagement of local leaders from diverse organizations in developing program goals (3.17, SD: 1.95) (Appendix 2). Similarly, the lowest scores for funding stability were observed in sub-domains related to having stable and flexible funding beyond current funding cycle (3.14, SD: 1.75) and being funded through a balanced contribution from various sources (3.17, SD:1.92). Conversely, regarding program adaptation, the highest scores were observed for programs adapting to new science/evidence as needed (5.82, SD: 1.47) and adapting strategies as needed (5.73, SD: 1.49). In terms of program evaluation, highest scores were observed for using program evaluation results to demonstrate successes to funders and other key stakeholders (5.77, SD: 1.41) and having capacity for quality program evaluation (5.68, SD: 1.39).

Table 2. Mean Sustainability Scores across 8 Domains of the PSAT for HIV KP Programs in Nigeria

Sustainability Domain	Definition of Domain	Mean (SD)
Political support	Having internal and external political environments that support the program	4.81 (1.52)
Funding stability	Establishing a consistent financial base for the program	3.56 (1.34)
Partnerships	Cultivating connections between your program and its stakeholders	3.17 (1.72)
Organizational capacity	Having the internal support and resources needed to effectively manage the program and its activities	5.37 (1.40)
Program evaluation	Assessing the program to inform planning and document results	5.59 (1.35)
Program adaptation	Taking actions that adapt the program to ensure its ongoing effectiveness	5.60 (1.36)
Communications	Strategic communication with stakeholders and the public about the program	5.23 (1.45)
Strategic planning	Using processes that guide the program's direction, goals, and strategies	4.44 (1.67)
Overall score		**4.72 (1.48)**

Political support (mean 4.81, SD: 1.52). Responding to open-ended questions, participants highlighted ***suboptimal political support*** for HIV KP programs underpinned by the prevailing sociopolitical context, hostile laws and policies that criminalize KPs including religious and cultural bias within the country. Some political champions were noted within government agencies, bilateral and multilateral donor organizations, non-governmental organizations (NGOs) and civil society organizations (CSOs). These champions were said to provide leadership and support within the programs but were limited by non-committal external support especially from the GoN partners. One participant noted that "*There is an absence of political support, especially from the relevant government agencies for HIV*." Participants also noted mixed but improving support from local stakeholders as awareness of the importance of the HIV KP programs increases. One participant stated that *"local stakeholders tacitly support KP intervention in the country. Many at the state levels are beginning to appreciate the imperativeness to providing access to services irrespective of sexual orientation"*.

Funding stability (mean 3.56, SD: 1.34). The prevailing hostile sociopolitical and legal context and predominantly external donor-dependent funding mechanisms with limited government and local contributions results in ***threatened funding stability*** of the HIV KP programs. While participants noted efforts to raise local contributions through the Federal Ministry of Health (FMoH) and National Agency for the Control of AIDS' (NACA) public health approaches, results were said to be limited by lack of legislative support for KP programs and pervasive discrimination against KPs. Most respondents expressed concerns about the capacity for their programs to secure funding beyond the current cycle, emphasizing the need for follow-on donor funding, while exploring alternative donor funding sources.

Partnerships (mean 3.17, SD: 1,72). Participants emphasized efforts to build diverse partnerships with stakeholders relevant to the success of the HIV KP programs but noted the

need for strengthened partnerships between programs and local community partners and the private sector organizations. While some participants noted that diverse stakeholders (including NACA, FMoH, security agencies, NGOs, public and private agencies, PEPFAR, Global Fund and KP-led community-based organizations (CBOs)) were engaged in developing program goals, others were unsure about the extent of this engagement. However, some participants expressed hope for these partnerships to grow – "*the private sector is least engaged, but there is the promise for increased engagement in the future".*

Organizational capacity (mean 5.37, SD: 1.40). Most participants suggested that the HIV KP programs have ***developed organizational capacity***, benefiting from dedicated funding, and integrating their functions within organizational structures of implementing organizations. Strong leadership within implementing organizations in terms of communicating a clear vision, effectively managing resources, conducting advocacy with partners, and establishing strong leadership structures were noted as important factors contributing to this organizational capacity. However, some participants expressed concerns about having adequate human resources for health (HRH) especially at the state, facility, and community level. Participants acknowledged the role of funding in securing adequate HRH.

Program evaluation (mean 5.59, SD: 1.35). A well-***developed high-quality program monitoring and evaluation capacities*** driven by a skilled workforce that is motivated towards short- and long-term outcomes that inform program adaptations guided by epidemic control indices and goals were considered a key strength for sustainability. However, some participants noted that longstanding data quality issues and, in some cases, nonalignment of program goals with local development goals may be a concern. However, participants agreed that the programs have developed mechanisms for sharing program data with stakeholders, to help to increase transparency and accountability. While there was agreement about the successes of the HIV KP programs, some participants suggested that the programs do not do enough to showcase its successes to the public.

Program adaptation (mean 5.60, SD: 1.36). The HIV KP programs were also seen as being ***highly adaptable***, relying on diverse evidence from program data, implementation science, and community feedback to ensure that the programs continue to be effective. Specific examples of recent program adaptations included integrating COVID-19 and Mpox in program planning and service delivery, adoption, and pilot of harm reduction for PWID, and implementation of event-driven pre-exposure prophylaxis (PrEP) for other KPs beyond MSM. However, some participants asserted that programs were frequently adapted based on opinions of program managers and donors rather than available evidence. Others highlighted the need for better coordination of program adaptation among program partners. *"KP programs are open to new science, particularly using proof of concepts and implementation science. However, this needs to be better coordinated".*

Communications (mean 5.23, SD 1.45). HIV KP programs were said to emphasize ***communication efforts but were often limited by the diverse sociocultural contexts*** which determine the extent to which the need for the programs may be discussed with local stakeholders and affected communities to raise awareness. Participants stressed the need for targeted communication efforts, considering the sensitivity of KP issues at the local community level and the need for wider public education on HIV and STIs prevention and treatment. While there is some understanding of the program's value among stakeholders, much work remains to demonstrate this same value to communities.

Strategic Planning (mean 4.44, SD: 1.67). In terms of the sustainability of strategic planning, participants considered it to be ***largely donor-driven and cyclical,*** with non-costed national strategic plans which make long-term planning difficult. Participants noted that there were sustainability plans with the KP program linked to the larger HIV/AIDS program strategy, but only few were aware about the details of the plan. Further, participants noted efforts by programs to communicate their goals with clearly laid out responsibilities for stakeholders, including program beneficiaries who are increasingly taking on program roles. However, participants raised concerns about the ability to sustain stakeholder commitments when funding ceases especially given the sociopolitical context – "*while stakeholders understand the public health imperative of the program, the social and political context makes it challenging for them to champion it actively"*.

Discussion

This study used a mixed-method approach to assess KP access to HIV services, available competency to provide KP-friendly services at public facilities and OSS, and to determine the ability of the program to maintain programing and its benefits over time. The mixed methods study design deepened understanding and of and presented a holistic view of the KP HIV program, barriers to access, available competency to provide KP services at facilities, and factors that affect sustainability of the program. This research sought to answer the following questions: ***Does the HIV program for key populations have the capacity (structures and processes) for sustainability beyond current funding***?

Establishing program sustainability metrics is an important first step in ensuring successful transition of donor funded projects while maintaining momentum towards HIV epidemic control, especially within KPs that are disproportionately affected by the disease [17]. We found that overall, the Nigerian HIV KP programs have demonstrated moderate level of sustainability with key domains of strength being program adaptation, program evaluation and organizational capacity. Our findings mirror other studies [14, 18] where program adaptation and monitoring and evaluation scored highest. However, in our findings sustainability of the HIV KP programs in Nigeria is threatened by suboptimal political supports, funding stability and local partnerships especially within communities and in the private sector.

In a similar study [18], funding stability scored the lowest unlike our study where partnerships scored the lowest. The need for partnerships can be related to funding stability as these partnerships are expected t diversify the funding sources to sustain the program in the long term. has implications for funding stability. Further, we found that the key challenges to sustainability are underpinned by somewhat hostile sociopolitical and legal contexts of HIV KP programs in the country and non-committal support especially from the GoN (in terms of funding) which has reinforced the largely donor-driven nature of programs. This prevailing context was seen to influence other sustainability domains, limiting capacity for committed engagement with local communities and other relevant stakeholders and resulted in the need to adapt communication strategies to address sensitivities of communities.

To the best of our knowledge, this is the first study exploring the sustainability of HIV KP programs in Nigeria and other similar contexts in Africa, using standardized multidomain tools like the PSAT. While many studies of HIV program sustainability have focused narrowly on funding, there have been recommendations to adopt a multidimensional view of sustainability, exploring the internal and external environments of programs [17, 19]. Studies have assessed the sustainability of

broader HIV/AIDS programs in sub-Saharan Africa.

A recent systematic review of the sustainability of differentiated service delivery programs had findings that were congruent with ours, identifying organizational capacity and program design as highest scoring domains, while suboptimal stakeholder engagement, unfavorable laws and policies and stigma were important contextual factors limiting sustainability of HIV programs [20]. Similar contexts were noted as being limiting factors in another evaluation of HIV programs in Zimbabwe [21].

The Joint United Nations Programme on HIV/AIDS (UNAIDS) and other multilateral donor agencies have recognized the imperative for sustainability planning at this state of the global HIV/AIDS control program [22]. This imperative has been reflected in the structure of HIV control programs including the HIV KP programs in Nigeria, which have focused largely on building institutional/organizational capacity within programs, ensuring local workforce capacity for program evaluation and evidence-based program implementation relying on implementation science methods. Therefore, it is no surprise that HIV KP programs have demonstrated strengths in these domains.

However, key sociocultural and legal headwinds continue to limit progress across other domains. For example, the Same-Sex Marriage Prohibition Act, signed into law in Nigeria in 2014 simultaneously reflects and reinforces the stigma and discriminations that KPs, often limiting access to care services offered by the HIV KP programs [23]. While governments have adopted a public health approach to secure access to care in this context, there are limits to the political supports and funding that these programs can establish especially within communities with pervasive stigma.

The United Nations General Assembly in 2021, noted this challenge and emphasized the need for stronger community engagements, coordination and integration among partners, and community education as to address stigma, using a human rights approach [22, 24]. Further, while country ownership of programs has been increasing, a key challenge is that gaps remain in the local contribution to financing required to support HIV programs [20, 22]. A key recommendation has been to include HIV/AIDS programs within universal health coverage (UHC) efforts, to ensure that vulnerable populations continue to access services [22]. However, financing UHC in Nigeria, remains a challenge.

Our findings have implications for the Nigerian HIV programs which are being planned and prepared for transition to the GoN with no considerations of the KP program. Despite moderate level of sustainability in terms of organizational capacity, evaluation, and adaptability, we believe that insufficient political support and funding instability in a relatively hostile context will increase the chances that the programs are not sustained. Donor agencies and implementing agencies must refocus advocacy efforts on securing financing, integration of HIV KP programs within UHC efforts, sourcing alternative funding from the private sector and strengthening the partnerships required to sustain programs [22]. More importantly, advocacy efforts to ensure a human rights approach to HIV care for KPs should be pursued, alongside wider public communication to limit the pervasive effects of stigma and its impact on the HIV KP programs [24, 25]. Securing sustainable funding is a challenge that will require innovative approaches to health financing. Securing partnerships within the private sector, alongside other innovative approaches to care that ensure shared contributions from all partners where possible. However, more research is required to determine how such financing approaches might work, within such wider sociocultural contexts as described in this study.

The strength of this study lies in its multidimensional approach to assessing sustainability of HIV KP programs in Nigeria, using a standardized tool that combined quantitative and qualitative data. Further, our inclusion of a wide array of organizations across the national, state and community levels implies a rather comprehensive view of sustainability of HIV KP programs across the 3 states. However, we used a convenient sample which may limit the generalizability. However, we believe that our context rich descriptions may improve the transferability of the findings to other similar contexts. Further, our approach to interviewer administered questionnaires may have introduced the risk of social desirability bias. However, the range of cadres of health workers, program managers and other stakeholders included in this study make this bias quite unlikely.

Conclusion

HIV response in Nigeria has evolved to better serve KP clients. The organizational capacity and program evaluation and adaptation of HIV KP programs were sustainable in our study. However, unstable funding, limited partnerships, and suboptimal political support in an unfavorable sociopolitical and legal context restrict sustainability efforts. Given the impending transition of these programs to the GoN, programs must strengthen advocacy and communication to reduce stigma and integrate their programs into wider UHC-covered programs. Nigeria will benefit from transformative partnerships that go beyond public authorities and donors, using a whole-of-society approach to work with relevant stakeholders, including KP communities and the private sector, to drive KP acceptance, reduce stigma and discrimination, and ensure transparent and equitable HIV response resource allocation.

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Conflict of Interest

Author declares that there is no conflict of interest.

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Determinants of Antituberculosis Drug Acceptability among Children with Tuberculosis in Osun State Nigeria

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Abstract

Acceptability of antituberculosis drugs by affected caregivers and children is key to disease elimination. This is affected by many factors including drug, patients, and health institution-related factors. This study aims to assess the influence of the introduction of dispersible formulation on acceptability of antituberculosis drugs. A historical cohort design was used to assess and compare the acceptability of old loose non-dispersible and new dispersible antituberculosis drugs, using a convergent parallel mixed method of data collection. Determinants of tuberculosis drug acceptability were assessed using binary logistic regression. The findings were triangulated with results from the qualitative data. The rate of acceptability of the new dispersible formulation, 112 (88.2%) was significantly higher than the rate of acceptability of old loose non-dispersible drugs, 13 (10.5%), p<0.001. The median age of children with good acceptability, 7.0 (4.0 – 10.0) years was significantly lower than those with poor acceptability, 10.0 (8.0 – 13.0) years, p <0.001. Drug formulation was a significant predictor of acceptability; the fixed-dose dispersible drug had a higher probability of being acceptable relative to lose non-dispersible formulation, (Odd Ratio = 62.3, p <0.001, 95% CI= 25.3 – 153.3). The qualitative data showed that health education about tuberculosis has positive influences on drug acceptability. In conclusion, the formulation of drugs is a key factor in the acceptability of antituberculosis drugs. Hence, there is a need to further promote the recently introduced child-friendly antituberculosis drugs, coupled with strengthening the health education of caregivers to achieve tuberculosis elimination.

Keywords*: Antituberculosis, Acceptability, Fixed-Dose Combination, Dispersible, Tuberculosis.*

Introduction

Drug acceptability is a crucial concept in the achievement of treatment success and control of diseases of public health importance like tuberculosis. Consideration for the acceptability of drugs among paediatric age is essential due to the unique physiological makeup of this age group and poor perception of the benefit of taking a medication which is one of the motivators of drug acceptability and adherence among older age groups [1, 2]. Drug acceptability has varying views from the patients' and physicians' perspectives with some overlapped constructs. Patient drug acceptability refers to the degree to which a patient is willing to use or continue using a particular drug prescribed by their healthcare providers [3]. The acceptability of a drug from a physician's

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perspective on the other hand is viewed as the degree to which a particular drug is deemed acceptable for use by medical professionals, regulatory bodies, and the general public. The commonly identified determinants of drug acceptability from the physician's perspective are the drug's safety profile, efficacy, potential side effects, and the severity of the medical condition it is intended to treat [3].

Determinants of drug acceptability among children are multidimensional; this has been viewed using various frameworks. Three main constructs were identified in a tuberculosis treatment acceptability study conducted among children with tuberculosis: usability, receptivity, and integration [4]. While the construct for usability assessed drug-related factors like the taste of drugs and ease of administration, and how appealing the drugs look; receptivity dwelt on adverse reactions to drugs, perception of the disease, and health generally. The integration construct assessed socioeconomic factors and health system delivery factors that may affect the acceptability of antituberculosis drugs among children. The determinants can also be simply viewed from stakeholders' perspective to comprise the child-related factors, caregivers' factors, and influence of health and social system.

Age of a child is one of the child-related factors that has been established to strongly influence acceptability of a drug formulation [5-9]. The acceptability of tablets was observed to be higher among older children, especially above six years compared to children of younger age groups where syrup and suspensions were more acceptable [10]. The awareness of the benefit of taking a medication among older children has also been attributed to a higher level of acceptability [4].

Among the drug factors that have been identified as determinants of drug acceptability are the taste and odour of the medication. Also, the frequency and dosage of drugs are key factors in drug acceptance [11]. Tuberculosis being a chronic infectious disease that requires a long duration of treatment makes the acceptability of antituberculosis drug imperative, especially among children. Children being more at risk of the disease has drawn much research attention towards drug formulations that will promote antituberculosis acceptability, treatment compliance, and adherence to treatment [12-14]. The efforts aimed at ensuring acceptability, a key step to achieving infection control, have led to varying formulations like fixed-dose combination tablets, syrup, suspension, and dispersible tablets.

The effects of antituberculosis drug formulation on the acceptability of the medication among children have been assessed by a few studies [2, 12-14]. A study conducted to compare the acceptability of fixed-dose combination (FDC) dispersible antituberculosis drug and that of loose non-dispersible tablets among children at the intensive phase of treatment showed that the dispersible antituberculosis drug had higher acceptability [12]. In addition, the study also showed that FDC dispersible drug had less hepatotoxicity while maintaining equal efficacy with the single tablets' formulation [12]. A similar comparative study of the acceptability of child-friendly levofloxacin dispersible was conducted among South African children living with Tuberculosis. The study showed good acceptability of the new child-friendly dispersible formulation relative to pre-existing adult tablets.

The World Health Organization commenced the use of a child-friendly dispersible antituberculosis drug in 2015 [15] and was introduced to the Nigeria Health System in 2018. There is, however, a dearth of studies on the acceptability of the new formulation relative to the pre-existing non-dispersible fixed-dose medications since its introduction. This study, therefore, assesses and compares the acceptability of the new child-friendly fixed-dose dispersible antituberculosis drug with a non-dispersible loose formulation. The findings would form the bases for future public health

intervention in Tuberculosis Control Programme.

Methodology

Description of Study Area

The research was conducted in Osun State. Osun State is a land-locked state located in the South-west region of Nigeria, 7°30′N 4°30′E [16, 17]. It has a total population of 3,423,535 million (National Population Figures of 2006) with a 2023 population projection figure of 5,123,586 based on an annual growth rate of 2.4% [18]. Osun state is mainly an agrarian state in the tropical rainforest of Nigeria. The state has 30 local government areas which have been classified into 15 urban local government areas and 15 rural local government areas (LGAs).

Each LGA has between 10 and 11 wards with at least a primary health centre per ward to ensure access to healthcare. All the primary health centres have facilities for vaccination, including BCG, and provision of primary care for locally endemic diseases like diarrheal diseases. There are specific primary health centres spread within each local government area of the state that provide DOTS services for drug-sensitive tuberculosis. All the healthcare facilities providing DOTS services currently use the new child-friendly dispersible fixed-dose antituberculosis drug. Some facilities however still use both the new dispersible and old non-dispersible drugs concurrently. This thus reduces the barrier of physical access to facilities that offer both preventive and curative services for tuberculosis. The state also has referral centres for drug-resistant tuberculosis and other complications resulting from tuberculosis infection.

Study Design

The study was conducted using a historical cohort study design. Quantitative and qualitative data were collected. The retrospective section of the study involved the interview of children that used non-dispersible loose antituberculosis drugs between 2018 to 2020 and their caregivers. The children that took child-friendly dispersible antituberculosis drugs 2020-2022 were also interviewed to determine their acceptability of antituberculosis drug formulation. Study population: children (0 – 14 years) with drug-sensitive pulmonary tuberculosis in Osun State.

Sample size and Sampling Technique

The sample size (N) was calculated to get an absolute precision of ± 5% using the sample size formula for comparison between two proportions [19]. Since the study population is relatively small or finite (i.e., less than 10000), the finite population correction for proportions was used by dividing the sample size N by 1 + [N – 1/10,000] [19]. After correcting for an anticipated non-response rate of 10%, the sample size was 123 for each group. The sample size was calculated based on the proportion of children who developed hepatotoxic-related side effects to child-friendly dispersible antituberculosis drugs (9.6%) and non-dispersible loose antituberculosis drugs (16.4%) in a similar study conducted among children with drug-sensitive pulmonary tuberculosis [12]. The study sample for the qualitative aspect was selected using a convenient sampling technique. The interviewees were representative of mothers whose children are Tuberculosis patients and uptaking dispersible and non-dispersible antituberculosis drugs.

Data Collection

Quantitative data was collected using an interviewer administered questionnaire, administered electronically using an android application, mWater Survey. The first section of the questionnaire assessed the characteristics of the children and their households while the second section comprised questions that assessed the acceptability of antituberculosis drugs. The last two sections assessed the level of knowledge of the caregivers about tuberculosis and the support received while receiving treatment respectively.

The Qualitative aspect adopted Key informant interviews, In-depth interviews, and Focused-Group Discussion Guides to explore the determinants of acceptability of antituberculosis drugs. The guides explore the perception of participants about the disease, treatments, and their experience with antituberculosis drugs. Likewise, common factors that enhance acceptability and adherence to treatment were also investigated by the guides.

Data Analysis Plan

Data were analysed using SPSS version 27 for Windows. The qualitative data were analysed using thematic and content analysis. The data were triangulated, and the qualitative data were used to strengthen the findings from the quantitative data.

Results

The median age of the children that took the new dispersible antituberculosis drugs was 6.0 (4.0 – 10.0) years while the median age of children that took old loose dose non-dispersible drugs was 10.0 (8.0 – 13.0) years, $P < 0.001$. There was a statistically significant difference between the educational status of children in the two drug formulation groups, $p < 0.001$. There were no out-of-school children among the children that took old non-dispersible formulation while 20 (15.7%) were out of school among children that took FDC dispersible formulation. The proportion of caregivers/mothers with good knowledge of tuberculosis was significantly higher among caregivers with children that used old non-dispersible formulation, 54 (56.8%) relative to the proportion with good knowledge among those that use new dispersible formulation, 41 (43.2%), $p = 0.023$. There were no significant associations between drug formulation and other participants' characteristics like religion, level of education of parents/caregivers, and wealth index. (Table 1).

Table 1. Comparison of Participants' Characteristics Across the Study Groups

Variables	**New Dispersible Drug n (%)**	**Old Loose Doses Non-dispersible drugs n (%)**	**Statistics**
Age of the child (years)	6.0 (4.0 – 10.0)	10.0 (8.0 – 13.0)	U = 3853.5
			p < 0.001
Religion			
Christianity	51 (40.2)	62 (50.0)	LR = 4.069
Islam	76 (59.8)	61 (49.2)	p = 0.131
others	0 (0.0)	1 (0.8)	
Mothers' Occupation			
Artisan	31 (24.4)	31 (25.0)	LR = 17.868
Civil Servant	14 (11.0)	6 (4.8)	p = 0.003
Farming	25 (19.7)	44 (35.5)	
Housewife	6 (4.7)	2 (1.6)	
Trading	46 (36.2)	41 (33.1)	
Other (please specify)	5 (3.9)	0 (0.0)	
Child Educational Status			
In school	107 (84.3)	124 (100.0)	$X^2 = 21.218$
Out of School	20 (15.7)	0 (0.0)	p < 0.001
Mothers' Level of Education			
No formal education	16 (12.6)	21 (16.9)	$X^2 = 3.486$
Primary	44 (34.6)	42 (33.9)	p = 0.480

Secondary	37 (29.1)	42 (33.9)	
Diploma	21 (16.5)	13 (10.5)	
University Degree	9 (7.1)	5 (4.8)	
Fathers' Level of Education			
No formal education	12 (9.4)	23 (18.5)	$X^2 = 7.368$
Primary	30 (23.6)	33 (26.6)	$p = 0.118$
Secondary	52 (40.9)	47 (37.9)	
Diploma	17 (13.4)	8 (6.5)	
University Degree	16 (12.6)	13 (10.5)	
Households' Wealth Index			
1	19 (15.0)	30 (24.2)	$X^2 = 4.931$
2	24 (18.9)	27 (21.8)	$p = 0.294$
3	29 (22.8)	22 (17.7)	
4	26 (20.5)	24 (19.4)	
5	29 (22.8)	21 (16.9)	
Knowledge of Tuberculosis			
Poor	86 (67.7)	70 (56.5)	$X^2 = 7.522$
Good	41 (32.3)	54 (43.5)	$p = 0.023$

Table 2 compares various components of acceptability among participants that experience the use of new dispersible drugs and old single doses of non-dispersible drugs. Majority of the caregivers that used the new dispersible antituberculosis drugs, 112 (88.2%) were satisfied with the dosage preparation relative to the proportion of caregivers that were satisfied among those that used old single doses of non-dispersible drugs, 20 (16.1%), $p < 0.001$. There was a statistically significant difference between the perceived ease of dissolving the two drug formulations in water for ease of administration to children, $p < 0.001$. Most of the caregivers using the new dispersible drugs, 122 (96.1%) perceived their drugs to be easy to dissolve while only 23 (18.5%) of the caregivers that used the old non-dispersible drugs perceived the drug to be easy to dissolve. Most children that used dispersible drugs perceived the drug as having good taste, 100 (78.7%) while the proportion that reported good taste using old single doses of non-dispersible drugs was low, 19 (15.3%), $p<0.05$. Statistically significantly higher proportions of caregivers using new dispersible drugs felt the taste was good and felt the administration of drugs was easy compared to caregivers using the old non-dispersible drugs, $p < 0.001$ respectively.

Table 2. Association between Drug Formulation Received and Acceptability of Antituberculosis Drugs

Variables	**New Dispersible Drug n (%)**	**Old Loose Doses Non dispersible drugs n (%)**	**Statistics**
Caregivers' feelings about the preparation of the doses			
Poor	15 (11.8)	104 (83.9)	$X^2 = 130.667$
Good	112 (88.2)	20 (16.1)	$p < 0.001$
Ease of dissolving medication in water			
Poor	5 (3.9)	101 (81.5)	$X^2 = 154.523$
Good	122 (96.1)	23 (18.5)	$p < 0.001$
Caregivers' feelings about the administration of the doses			

Poor	6 (4.7)	101 (81.5)	$X^2 = 151.026$
Good	121 (95.3)	23 (18.5)	$p < 0.001$
Caregivers' perception of the taste of the drug			
Poor	32 (25.2)	99 (79.8)	$X^2 = 75.075$
Good	95 (74.8)	25 (20.2)	$p < 0.001$
Child's feeling about the taste of the drug			
Poor	27 (21.3)	105 (84.7)	$X^2 = 101.204$
Good	100 (78.7)	19 (15.3)	$p < 0.001$

The findings above were supported by the submissions from the qualitative data support on the association between acceptability of antituberculosis and drug formulation. Most interviewees and participants in FGD that used new dispersible antituberculosis admitted to the ease of dissolving the tablets in water while those that used old drugs complained of the need to grind the medications for kids that could not swallow pills. The taste of pills was also mentioned by virtually all the participants. This is explicated in the excerpts below:

"My child seems to like the taste of the drug as she does bring it and spoon to me even when I forget" (An IDI participant, a 67 years Grandmother, Dispersible antituberculosis drug).

"Grinding the drugs everyday was tiring, my only consolation was that my son was getting better, that kept me going ... He does not like one of the pills; giving him the drugs is usually a thug of war, but we thank God" (33 years Mother, Old loose doses non-dispersible drugs, an IDI participant).

Figure 1 showed a comparison between the overall acceptability of the new fixed-dose dispersible antituberculosis drug and old loose doses of non-dispersible antituberculosis drugs. The proportion of participants with good acceptability among participants that used new dispersible, 112 (88.2%) was significantly higher than the proportion of participants that had good antituberculosis drug acceptability among participants that used old non-dispersible drugs, 13 (10.5%), $p < 0.001$.

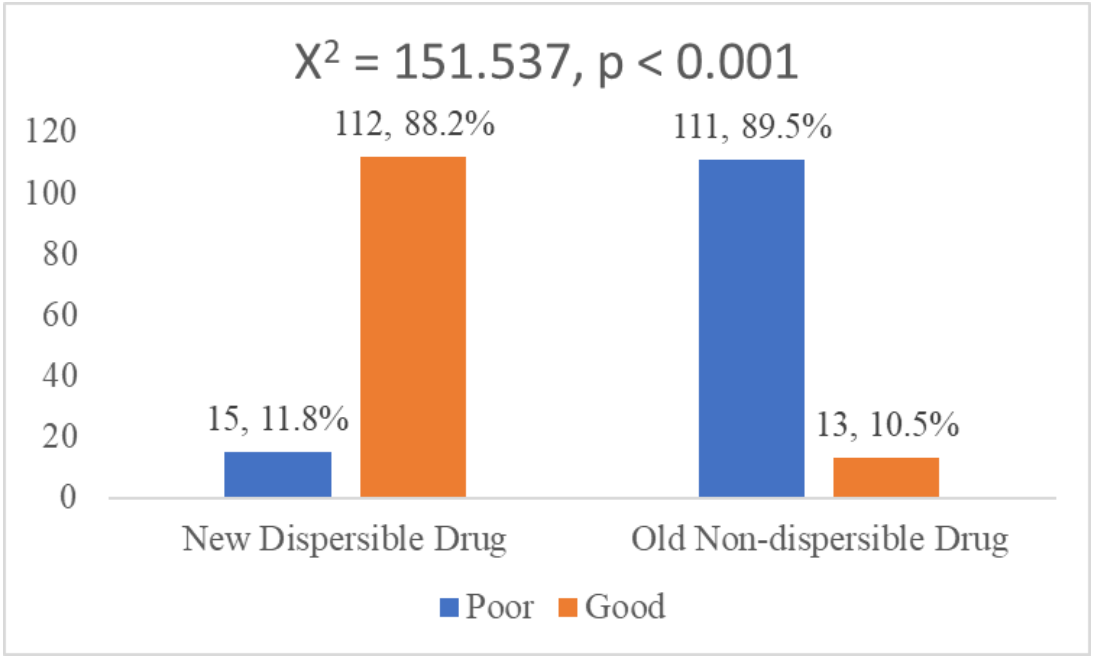

Figure 1. Comparison between the Acceptability of New Dispersible and Old Loose Doses Non-dispersible Drugs

Table 3 assessed the associations between the acceptability of antituberculosis drugs and participants' characteristics. There was a significant association between the age of children and the acceptability of antituberculosis drugs, $p < 0.001$. A younger age group, 7.0(4.0 – 10.0) years had good acceptability while an older age group, 10.0(8.0 – 13.0) years had poor acceptability. There was also a significant association between the child's educational status and acceptability of drugs, $p = 0.001$. A higher proportion of out-of-school children was observed to be higher among children with good acceptability, 17(85.0%) compared to the proportion among people with poor acceptability, 3(15.0%). There was no significant association between the acceptability of antituberculosis drugs and other participants' characteristics – religion, mothers' education, caregivers' level of education, wealth index, and the knowledge of tuberculosis among caregivers.

Table 3. Association between Participants' Characteristics and Acceptability of Antituberculosis Drugs

Variables	**Acceptability of Antituberculosis Drugs**		**Statistics**
	Poor n (%)	**Good n (%)**	
Age	10.0 (8.0 – 13.0)	7.0 (4.0 – 10.0)	U = 4289.5
			p < 0.001
Religion			
Christianity	63 (55.8)	50 (44.2)	LR = 4.117
Islam	62 (45.3)	75 (54.7)	p = 0.128
Others	1 (100.0)	0 (0.0)	
Mothers' Occupation			
Artisan	30 (48.4)	32 (51.6)	LR = 8.356
Civil Servant	7 (35.0)	13 (65.0)	p = 0.133
Farming	44 (63.8)	25 (36.2)	
Housewife	3 (37.5)	5 (62.5)	
Trading	2 (40.0)	3 (60.0)	
Other (please specify)	40 (46.0)	47 (54.0)	
Child Educational Status			
In school	123 (53.2)	108 (46.8)	$X^2 = 10.770$
Out of School	3 (15.0)	17 (85.0)	p = 0.001
Mothers' Level of Education			
No formal education	21 (56.8)	16 (43.2)	$X^2 = 2.344$
Primary	44 (51.2)	42 (48.8)	p = 0.673
Secondary	35 (44.3)	44 (55.7)	
Diploma	17 (50.0)	17 (50.0)	
University Degree	9 (60.0)	6 (40.0)	
Fathers' Level of Education			
No formal education	22 (62.9)	13 (37.1)	$X^2 = 2.653$
Primary	31 (49.2)	32 (50.8)	p = 0.617
Secondary	47 (47.5)	52 (52.5)	
Diploma	12 (48.0)	13 (52.0)	
University Degree	14 (48.3)	15 (51.7)	
Households' Wealth Index			
1	28 (57.1)	21 (42.9)	$X^2 = 3.638$

2	29 (56.9)	22 (43.1)	p = 0.457
3	22 (43.1)	29 (56.9)	
4	22 (44.0)	28 (56.0)	
5	25 (50.0)	25 (50.0)	
Knowledge of Tuberculosis			
Poor	76 (48.7)	80 (51.3)	$X^2 = 0.362$
Good	50 (52.6)	45 (47.4)	p = 0.548

The findings from the qualitative data expatiate on the role of health education from the healthcare workers which was also observed to influence the caregiver's acceptability and perception of the disease severity as shown in the excerpt below:

"When I came to the health center the nurse told me that the cough my child had was different from the common cough other children use to have and it can kill my child. She said only the drug at the center can cure the baby, not medicine at chemists. I had no option than to force the baby to take the drug; my baby must not die" (35 years old mother of a child that took an old single loose non-dispersible drug and one of the selected IDI participants).

Table 4 showed the factors affecting the acceptability of antituberculosis drugs using a binary logistic regression. The probability of having good acceptability of antituberculosis drugs was 62.3 times higher among participants that used fixed-dose dispersible drugs compared to participants that used loose doses non-dispersible antituberculosis drugs, (Odds Ratio = 62.3, $p < 0.001$, 95%CI = 25.3 – 153.3. The ages of the children, levels of knowledge of caregivers, and educational status of children were not significant predictors of acceptability of antituberculosis drugs.

Table 4. Binary Logistic Regression of Association Between Selected Participants' Characteristics and Acceptability of Antituberculosis Drugs

Variables	**Odds Ratio**	**p-value**	**95% CI**
Educational status of the child			
Out of school	Ref	0.238	0.541 – 11.821
In school	2.5		
Knowledge of Tuberculosis			
Poor	Ref	0.188	0.755 – 4.207
Good	1.9		
Type of drugs			
Loose doses non-dispersible	Ref	< 0.001	26.247 – 156.620
Fixed-dose dispersible	64.1		
Age (years)	-0.105	0.102	0.794 – 1.021

Finding from the qualitative data showed that the major side effect observed across the two study groups was discouloration of urine which was a threat to acceptability and compliance with treatment. Majority of the caregivers interviewed acknowledge the important role of health education received from the healthcare providers and other sources in allaying the resulting fear. This is supported by the following excerpts:

"a note from my son's teacher that he passed red urine got me so scared that I could not sleep. I was confused if it was the drug that caused it or if the cough has damaged the organs. Though I was sceptical about continuing the drug, the reassurance of our matron really helped me to

keep the hope alive and complete the treatment" (an IDI participant, a 32 years old mother in Aiyedire LGA).

"I was not so scared on seeing my son passing reddish urine because our mind has been prepared against the common side effects of the drugs in the clinic" (an IDI participant, a 52 years old grandmother in Ife-North LGA).

Discussion

There was a significant difference in the age of participants across the two study groups. This could be due to the period when the new dispersible antituberculosis formulation was introduced, 2018. Only a few children born after the period of introduction of the new drug formulation used old single doses of non-dispersible drugs, especially in rural areas where there are logistic challenges with drug supply. All out-of-school children were observed to be among children using new dispersible antituberculosis drugs. This could be due to a younger age of a proportion of children in this drug formulation group; a significant proportion of the children were in the preschool age group. The caregivers that used the old non-dispersible formulation had better knowledge of tuberculosis relative to caregivers that used the new dispersible formulation. This could be due to variations in the mode and intensity of health education exposure over the years when the caregivers' children were on treatment.

Significant differences were observed in various drug factors across the two study groups. Majority of the caregivers were satisfied with the new antituberculosis formulation relative to the old formulations. This could be attributed to various drug factors that were considered in making the new antituberculosis drug. Rather than loose doses of pills that could not easily be dissolved in water. The new drug formulation had the characteristics of being a fixed-dose combination of multiple drugs in a single tablet. In addition, it is easier to dissolve in water, thus making it available in suspension form before administration. The use of a single tablet rather than multiple tablets in old loose doses, coupled with the ability to dissolve the drug easily into suspension which is more child-friendly contributes to the acceptability and satisfaction experienced with the use of new dispersible antituberculosis drugs compared with the loose doses non-dispersible formulation.

A similarly high level of acceptability of fixed-dose combination was observed in a qualitative study conducted among caregivers of children with tuberculosis in South Africa [13]. Most of the participants in the study identified inability to dissolve the FDC formulation and the time required for the drug administration as challenges, thus resulting in the manipulation of drugs to ease administration. The new dispersible FDC formulation is an improvement on the drug used in the South African study as the new formulation is dispersible and the dosage is once a day. Previous studies on the effects of drug formulations on acceptability of drugs for the treatment of other chronic disease conditions were in agreement with the findings of this study that fixed-dose combination was more acceptable relative to single loose dose formulations [20-23]. The domain of solubility of drug formulation was however not considered in some of the studies since they were mainly conducted among adults.

The taste of drugs is an important factor in drug formulations for children. Both the caregivers and children had good perceptions of the taste of the new dispersible drug. This could account for the higher acceptability of the new dispersible formulation because it was sweetened to make it child-friendly compared to the old loose doses' formulation, hence the ease of administration by caregivers with minimal resistance from the child. Age of the child also had a significant association with the acceptability of antituberculosis drugs. The acceptability was good among the younger age group and poor among older children. This could be due to variations in the drug formulation used by the children. The older children that were managed before the introduction of new

dispersible drugs may not have good acceptability of the antituberculosis drugs due to the many pills to use per dose, solubility, and tastes of the medications. Many previous studies among children were in agreement with the importance of taste on the acceptability of antituberculosis medications underscored by this study [4, 14, 23, 24].

Also, a dispersible formulation of the new FDC antituberculosis serves as a cost-effective approach to tuberculosis treatment among the paediatric age group. The dispersible formulation is acceptable to all paediatric age groups which profer a better solution to the age-specific formulation recommended by a study conducted among caregivers in India where oral liquid and tablets were recommended for children below six years and children that are six years and above respectively [10].

Health education from service providers and its influence on the caregivers' perception of tuberculosis was identified as a driver of acceptability. Perception of antituberculosis drugs as the only solution to child's illness based on the education received from healthcare workers influences acceptability irrespective of the drug formulation and frequency of administration. Though most similar studies focused on adherence to medication [25, 26], it could be deduced that they had similar findings of a positive relationship between health education and acceptability of medication since acceptability of medication is a precursor to adherence to treatment [27].

Conclusion

Overall, the drug factor was the only observed significant predictor of antituberculosis drug acceptability. The probability of having good acceptability was more with the usage of a child-friendly dispersible formulation. This could be attributed to properties of the drug like being tasty, fixed-dose combination, and being soluble in water hence, it can easily be converted to a form that is easier to administer to children of younger age groups. Ensuring universal access to this new formulation, coupled with the intensification of health education of caregivers are key to tuberculosis elimination.

Limitations of the Study

Majority of participants in the two study groups were on treatments at different periods as the new dispersible antituberculosis drug was introduced into Nigerian Health System in 2018. The acceptability of antituberculosis formulations available at the different periods could have been affected by other circumstantial factors peculiar to that period, Findings from those that are still using old non-dispersible drugs due to shortage of new formulation in some areas of study were however not different from those that used it before the introduction of the new formulation in 2018. The study period was limited to between 2018 and 2020 for those that used old non-dispersible drugs and 2021 – 2022 for those that used new dispersible drugs to limit the effect of recall bias on participants' responses.

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To Explore the Perceived Food Taboos during Pregnancy and their Relation to Maternal Nutrition and Health

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Abstract

The purpose of this study was to explore perceived food taboos during pregnancy and their relation to maternal nutritional status and health outcomes. The study was guided by the following objectives: To investigate food taboos identified for pregnant women in Namwala District, to identify dietary taboos that were embraced by the Women and to highlight nutritional challenges related to dietary taboos during pregnancy. Descriptive research design was used as the framework for carrying out the study with an estimated population comprising pregnant women who attended and received antenatal services at various clinics. From this estimated population, a sample comprising 74 pregnant women was selected using Purposive sampling method. SPSS V25 was used to analyze the raw data descriptively. The results clearly showed widespread practice of food taboos during pregnancy and the main reason for adherence was culture. The following interventions were recommended: Developing a team of community care givers, with the inclusion of traditional leadership to help break the barrier of food taboos in maternal nutrition. The Ministry of Education can spearhead a curriculum with maternal nutritional education in the school curriculum as early as primary school level in order to discourage people from observing detrimental food taboos. Ante-natal Clinics should include awareness strategies and a Health Feeding Programme in order to provide nutritious meals to pregnant women whist attending antenatal, like School Health Nutrition (SHN) in schools. This strategy would increase ante-natal attendance with definite positive health outcomes among them, reduction in the number of Pre-term births in Zambia.

Keywords*: Antenatal, Community, Culture, Feeding, Health, Maternal, Nutrition, Taboos.*

Introduction

Pregnancy requires a healthy diet that includes an adequate intake of carbohydrates, proteins, lipids, vitamins, minerals, fiber, and water in order to meet maternal and foetal needs [1]. A healthy diet includes a variety of foods from macro and micro-nutrients. For example, vegetables and fruits selected should have different colors such as green, yellow, brown, and orange in order to consume different vitamins and minerals. Meat products should consist of red and white meats, such as beef, goat meat as well as fish and chicken respectively.

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Legumes, nuts, seeds, and whole grains should also be part of the diet.

A caloric intake of a pregnant woman should increase by approximately 300 kcal/day [2]. However, pregnant women with limited resources often lack access to a healthy diet that provides for their increased nutritional requirements. Furthermore, Traditional practices and beliefs influence the eating behavior of women during pregnancy in different parts of the world. Food taboo is abstaining people from consuming some food or beverages because of some beliefs [3]. In this study food taboos may influence the women to abstain from consuming certain foods for religious, social, or cultural reasons during pregnancy [1] [3]. In many cultures, avoidance of selected foods is believed to protect the health of the mothers and their unborn babies.

Studies have indicated that women from various parts of the world including Zambia, are forced to abstain from nutritious foods as part of their traditional beliefs during pregnancy and lactating periods [3]. It is also important to note that every society, whether rural or urban in Zambia, has its own taboos in almost every aspect, followed throughout their way of life. It has been observed that many taboos target a woman's life, starting from birth, puberty, marriage, childbearing, motherhood, and widowhood as compared to a man's life [4].

In this study, the focus was on pregnant women. Taboos in relation to pregnancy are numerous [4]. A common belief supporting these pregnancy-related taboos is that breaking them may cause abortion or deformity to the new-born and further affect a woman's chances of conceiving yet again [5]. Other reasons include miscarriage and difficulties during delivery [6], their own prior negative experience or that of other women, as well as sign of respect for elders.

Religion in some cases, is the reason behind refusal of eating some foods. On a larger scale, social and cultural beliefs influence dietary taboos in this critical period of a woman's life. In Islam and Judaism, for example, women are not permitted to consume animal-based foods [2].

Whatever the advocacy championed, food avoidance is usually contrary to research findings in relation to appropriate types of foods and quantities required by pregnant women in order to ensure optimal maternal-foetal nutrition. Traditional beliefs may unfortunately influence women to disregard health care practitioners' recommendations or advice which in some instances has lead primarily to maternal and foetal malnutrition. Inadequate intake of micronutrients can lead to different types of deficiencies. Global micronutrient deficiency burdens have decreased since 1990 [7]. The potential burden of iodine deficiency in some developed countries, for example is worthy of attention. The results of this study can guide policy makers in implementing cost-effective interventions in order to reduce micronutrient deficiency burdens in pregnant women [7].

A healthy diet, one that includes adequate intake of all the needed macro and micro-nutrients is therefore cardinal for better health outcomes [8]. Additionally, consumption of a variety of nutrients from the food groups should be encouraged throughout the pregnancy up to full-term [9].

It should be noted that food taboos have a strong influence on pregnant women because they have been practiced for many generations, as a result, they are accepted as part of culture [4]. Since maternal and child health are inextricably linked, whatever affects the mother's health usually affects the child as well [8]. Unfortunately, a number of traditional food taboos that pregnant women accept and adopt are passed down to their children [10]. This means that more and more generations would continue embracing food taboos and beliefs.

The World Health Organization report on under-nutrition indicates that 45% of global deaths among children under the age of five amounts to about three million deaths each year [11]. According to UNICEF, cultural customs,

taboos, and beliefs contribute to causes of malnutrition in many developing countries in Sub-Saharan Africa [12]. Most cultural groups do not believe that a long successful outcome of having a healthy baby lies in an adequate supply of a well-balanced diet, absorption, and metabolism of the mother [13].

Apart from embracing food taboos, most pregnant women tend to have a liking towards the same types of foods which limits variety of nutrients needed for a successful outcome. Stunting is therefore one form of malnutrition that is a great concern globally due to associated negative health outcomes and incapacitation [14]. Factors that contribute to stunting include inadequate food intake, poor health, and social economic conditions. The poor-quality nutritional diets during pregnancy, also contribute to a higher number of stunted children at infancy and early childhood. The factors listed above have contributed to high prevalence of stunting in Zambia which has remained at 40% [15]. This percentage is unacceptable and requires various interventions in order to reduce nutritional based challenges in Zambia.

The primary function of food is to provide nourishment as already alluded to, despite society embracing dietary customs with different symbolic roles. An adequate balanced diet is, also importance during pregnancy in order to prevent psychological stress [11]. Stress and food taboos can therefore be a prerequisite for low pregnancy weight gain, preterm births, maternal morbidity, and higher mortality rates, especially in rural parts of Zambia.

Literature Review

The study's review of literature was based on the conceptual framework diagrammatically developed as shown below.

Conceptual Framework

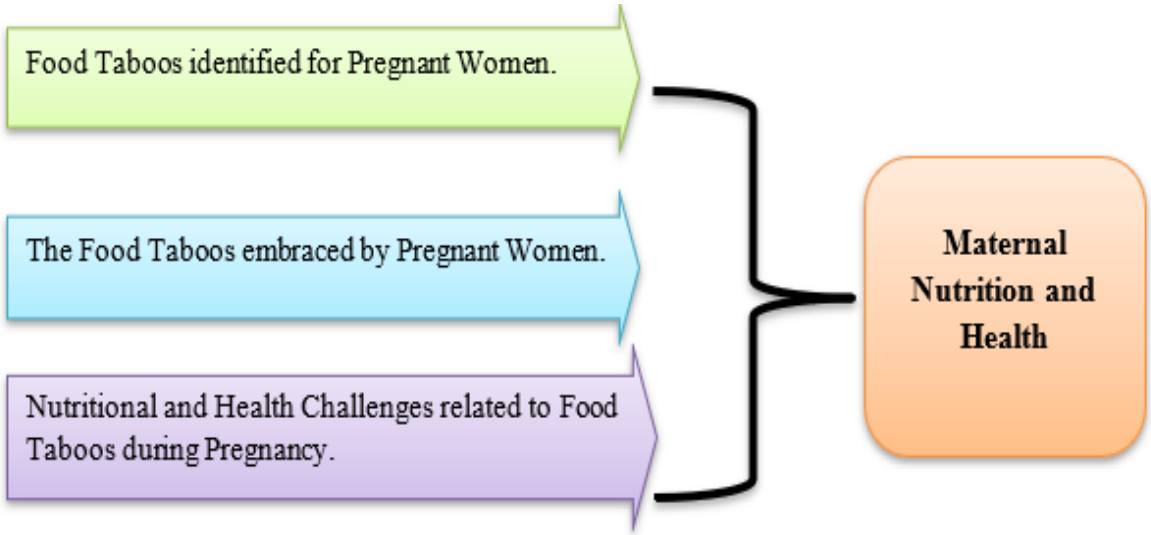


Figure 1. Conceptual Framework

Source: Research Writing, 2023

The conceptual framework above uses the cause and effect analysis model which allow for access to a problem and identify the root cause with the view to finding a solution. In this case, the three concepts, namely: food taboos identified during pregnancy, food taboos embraced as well as health challenges related to food taboos have a direct effect on maternal health.

The Effects of Food Taboos on Pregnant Women and the Unborn Baby

An adequate food consumption pattern and dietary diversity are critical for the overall growth, development, and health outcomes of

pregnant women, and children. The recent Global Nutrition Report 2020 revealed that every third child in low-developed countries is malnourished and expressed concerns regarding achieving the Global Nutrition Targets by 2025 [14]. Africa is considered a continent of diverse cultures, beliefs, and taboos, Zambia inclusive.

There are 73 ethnic groups in Zambia with varying and challenging nutritional traditions and taboos. This big number of groupings indicate the need to develop an elaborate body of knowledge concerning diverse cultural dietary practices during pregnancy as a basis for contextualized understanding and provision of effective guidelines and interventions on this topic. This is a critical issue, especially in areas with high levels of child stunting and maternal malnutrition [15].

Lack of knowledge on culturally prescribed nutritional taboos and beliefs have an impact on the outcome of malnutrition relief efforts or prevention campaigns and interventions [5]. Food beliefs and taboos are believed to be a global phenomenon intended to have positive effects on communities that practice them, including the conservation of scarce or sacred resources [5].

A woman, in a traditional context holds household food decision-making power such that in the event of a food shortage, husbands and children are usually prioritized, neglecting self despite being pregnant and in need of extra nutrition requirements. Culture stipulates that a husband should eat better than everyone else in a family setting. In addition, Food-Care Health Conceptual Framework lists cultural norms, taboos and beliefs as being among the factors that contribute to malnutrition among pregnant women due to failure to make use of available food resources in a given ecological zone because of taboos and beliefs [8].

Few researchers on this subject, have established the fact that pregnant women are restricted from eating certain food items such as eggs, liver, organ meats, kidney, milk, sweet potatoes, sugar, salt, and bananas because these foods are believed to cause obstructed labor [17]. One extreme belief is that of encouraging a woman to drink sour and too much water after a meal, in order to induce vomiting so that the baby can develop slowly and remain small to ensure less injuries during childbirth [5].

It is important to note that both rural and urban communities embrace taboos regarding foods to avoid during pregnancy, with local justifications as to why certain foods should be avoided [18]. Therefore, paying attention to and analyzing local pregnancy food taboos is an important public health goal for Public Health workers and Nutritionists in different parts of the world, especially Africa.

Pregnant women in Ethiopia practiced food taboos and beliefs in order to maintain harmony with natural and supernatural entities so that they could escape misfortune or calamity [18]. In Ghanaian communities, pregnant women avoided all cassava-based foods, fresh fish, corn dough porridge, eggs, and bananas to ensure healthy babies [19]. In most Western cultures, mice are considered unclean vermin, or pets that carry plague and are thus unfit for food. Mice, on the other hand, are popular in rural Thailand, Vietnam, and some African countries, including Zambia [17].

The American Heart Association reported in its study on food restrictions in Hong Kong that in order to maintain body harmony, pregnant women needed to avoid eating "wet-hot foods" such as shrimp, mango, lychee, and pineapple, as doing so produced a "poisonous" energy which manifested itself as allergy reactions on the skin of a baby. The baby would experience allergic reactions or skin eruptions [2].

It is clear that pregnancy restrictions can have both positive and negative effects on health-quality. Some foods that are avoided during pregnancy can in the real sense induce negative effects to the mother and the un-born child. For example, too much consumption of carbonated drinks, alcohol and too much fat can have a negative effect on maternal health. UNICEF discourages intake of tea and coffee with

caffeine during pregnancy [12]. Caffeine consumption during pregnancy, even in modest amounts (50mg or one half cup) is associated with lower birth weight below 2500g [20]. Drinking alcohol during pregnancy can cause physical, behavioral, and intellectual disabilities known as Foetal Alcohol Spectrum Disabilities (FASDs) which can last a lifetime [10].

While maternal lipid metabolism is critical for foetal development and positive long-term health outcomes such as energy storage, tissue growth, cell signalling, brain and immune system development [21], too much consumption can trigger obesity with negative outcomes such as maternal diabetes, and pre-term births [5].

Avoidance of the above listed foods, alcohol being one of them, is not based on nutritional benefits but on speculative reasoning and fear of the perceived consequences. Furthermore, it is believed that the spirits of the forefathers live very closely with the living, hence ensuring that genealogical values are upheld [11]. Food taboos, whether close to scientific benefits, or evidence-based knowledge are usually intended to protect an individual. The social norms are also meant for communities to corroborate well and maintain identity in the face of others and cultivate a sense of "belonging." [19].

Malnutrition During Pregnancy

Malnutrition occurs when the mother's food intake does not meet the energy requirements of both the mother and the foetus. The chances of malnutrition in pregnancy increase as the demand for calorie-rich food increases. Malnourished mothers are prone to infections, anaemia, lethargy, and fatigue. Intrauterine Growth Restriction (IUGC) and low birth weights are usually associated with maternal malnutrition, which can increase the chances of underdevelopment of the foetus's circulatory, digestive, nervous, and respiratory systems [14].

Data from 52 countries confirmed that the likelihood of a child becoming stunted or chronically undernourished increased substantially with poor nutrition during pregnancy [15]. Zambia has been faced with increased food insecurity, combined with rising poverty rates, high food prices due to the National debt and undependable whether patterns caused by climate change. This has resulted into low purchasing power for food.

Women Adherence to Food Taboos

In some parts of the world, pregnant women are not expected to eat meat and groundnuts because, consumption of the two foods can lead to the birth of what is termed as 'spirit children' (children deemed to possess evil spirits) [21]. When they disobey, they face stipulated consequences attached to the prohibited food.

A study conducted in India revealed that, fruits like grapes and bananas were prohibited and perceived as ''cold food''. The belief was that if included in the diet, a pregnant woman would experience fever [22]. Consumption of vegetables in a study conducted in Thailand was recommended. However, whether to eat them at the beginning of the pregnancy, during or at the end of pregnancy depended sorely on location of different populations and what they decided to believe in [23].

In Kenya, 89% of participants in one of the studies on food taboos recommended traditional leafy vegetables for the purpose of boasting blood levels [22]. Similarly, the Pendhalungan society recommended consumption of fruits and vegetables in large quantities than usual [24].

Traditional beliefs, coupled with negative attitude towards health workers in some places, affect utilization of health care facilities by pregnant women [17].

Methodology

Research Design

The study used the descriptive design [25]. The selection was based on the fact that descriptive investigations, unlike other types of investigations, carry out their study without altering or manipulating any of the variables of

the phenomenon. The study also used both qualitative and quantitative methods [26].

Study Population

The study population comprised of pregnant women who attended and received ante-natal services at three rural clinics in Namwala District.

Sample Size

The sample size comprised of 74 pregnant women from the study population [25].

Sampling Procedure

Purposive Sampling was employed in this study by randomly selecting respondents, who were pregnant women [27].

Research Instruments

The research used questionnaires and interviews for data collection.

Validity and Reliability

To ensure validity of the research instrument [28], it was subjected to peer-review at Chalimbana University followed by a pilot study on a selected sample.

Data Collection Procedure

Data collection was done by means of in-depth interview and questioning. All food taboos and cultural beliefs were documented.

Data Analysis

Statistical package for Social Sciences version 25 (SPSS V25) was used to analyze the data that was collected for the study [29].

Ethical Consideration

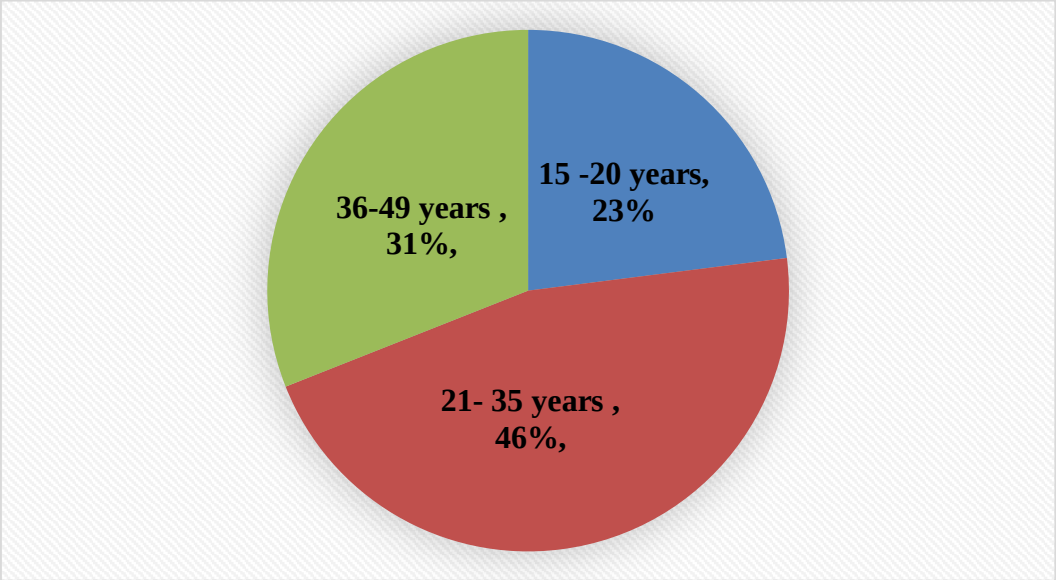
Permission

Permissions to conduct the research was granted by the District Health Office. Ethical guidelines were followed, informed concert, confidentiality, and the purpose of the research were clearly explained to respondents. Data obtained was kept as confidential.

Findings

Demographic Distribution

The age distribution of the respondents comprised of 23%, (n=17), between the ages of 15 to 20 years, 46%, (n=34) between the ages of 21 to 35 years and 31%, (n=23) between the ages of 36 to 49 years. It was concluded that the majority of the respondents were pregnant women who were in the age range of 21 years to 35 years.



Source: Research finding, 2023

Figure 2. Showing Age Distribution of Respondents

Level of Education

The raw data in Figure 3 is showing a frequency of 14% (n=11) who had no formal level of education, 59% (n=44) had attained primary school education level, 16% (n=12) had attained secondary school education level and 11% (n=8) had reached tertiary level of education.

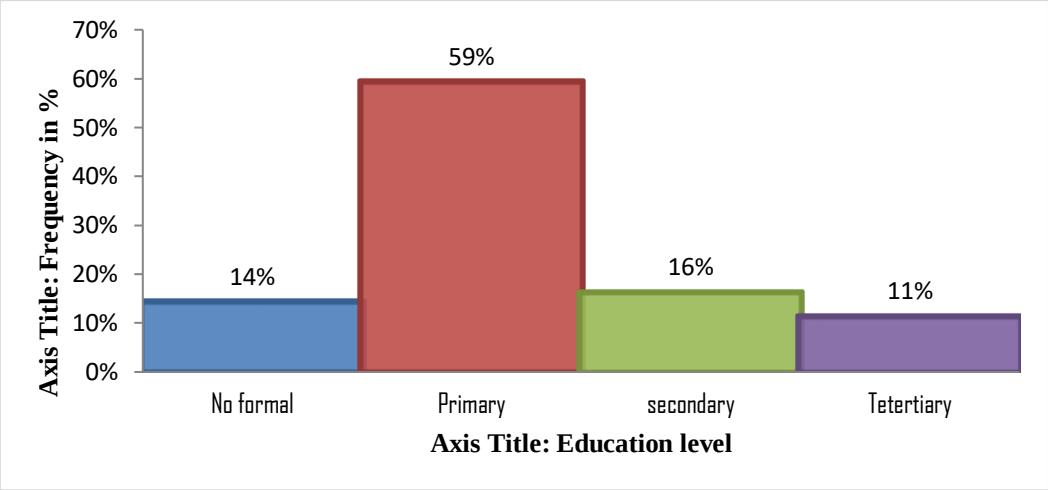


Figure 3. Showing Level of Education

Source: Research finding, 2023

The response in this figure shows that, the majority of the respondents had up to primary level of education.

The Type of Employment

The type of employment for the respondents are shown in Figure 4 below.

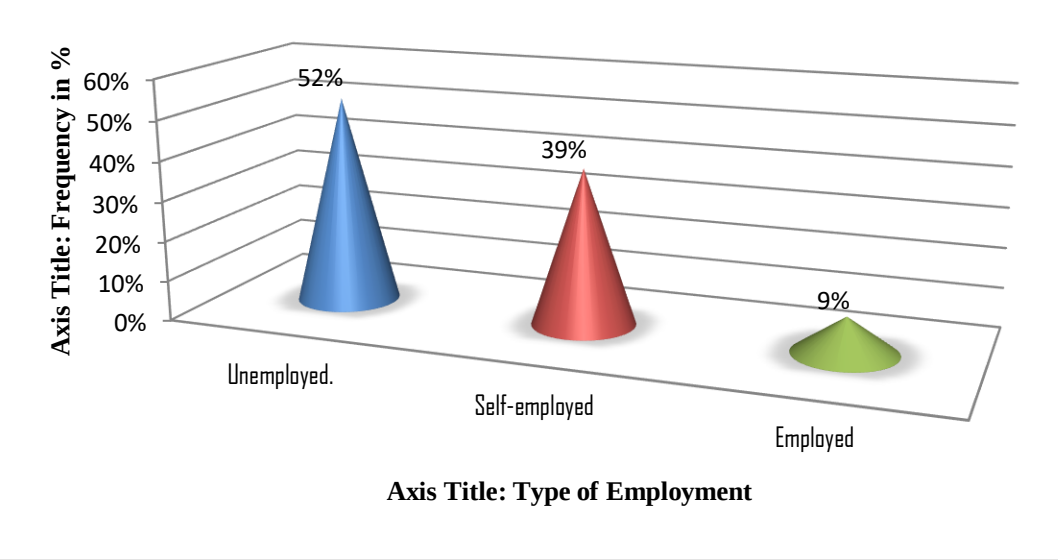


Figure 4. Showing the Type of Employment

Source: Research finding, 2023

Figure 4 above has the following raw data responses regarding the type of employment of the respondents: A frequency of 52% (n=38) were unemployed, 39% (n=29) self-employed and 9% (n=7) were in formal employment. It was concluded that most of the women in Namwala district were either unemployed or in self-unstaining employment.

Food Taboos that were Embraced during Pregnancy

The study sought to find out food taboos that were embraced during pregnancy and reasons for adhering to each one of them. Table 1 below shows the food taboos and reasons for embracing them.

Table 1. Food Taboos and Reasons for Avoidance

Food Avoided	Reason(s)
Butternut, mango, pawpaw, orange, Pumpkin	Baby will have jaundice
	Loss of hair
	Baby's face will be dark and other dark sports according to ancestors
Chili	Baby will have burned skin or dark marks
	Causes diarrhoea
	The baby will cry a lot
Eggs, Liver, Polony (Processed meat)	Baby will have no hair
	Liver can cause jaundice
Sweets, sugarcane, sweet food, honey	Baby will drool after birth
	Can develop eczema
Alcohol	Baby will be born disabled or can have brain damage
	Baby will be a drunkard
Green leafy vegetables	Baby will have too much saliva especially if gravy is too much in the vegetables
Mabisi (fermented milk) or Milk	Baby will vomit and have heartburn after birth
	Too much dandruff
	Baby will be born with white stuff on the head
	The baby will be lazy
Any cold food, drink, and ice	Baby will get pneumonia, cause kidney problems, may cause the baby to have skin problem and be underweight
Coke, soft drink, fizzy drinks	Burns baby skin, reduce milk production, causes asthma, acid will harm the baby, causes high blood pressure to the mother
Caffeine energy drinks, coffee	Causes abortion or miscarriage, increases blood pressure
Lemon (*Citrus limon* (L. Osbeck)	Will have a small (underweight baby)
Red meat	The baby will have gout, allergies, causes skin irritation
Bird meat	Baby will be very small, will talk too much, mother will have low supply of milk
Too much fat (oily food)	Mother will develop high blood pressure
	Increases heart rate
	Baby will get fat
	Causes heart disease to the baby
Groundnuts (*Arachishypogaea* L.)	Baby will come out with whitish stuff on the body Baby will vomit a lot
Sourly fruits	Baby will have malnutrition or will be skinny
Salt	Causes high blood pressure
Beans	Gives the mother heartburn
Potatoes	Increases the baby's weight making it harder to deliver
Pineapple	Pineapple causes miscarriage in early pregnancy

Rabbit meat	Baby's eyes will always be open like a rabbit
Mice	Not healthy food, has micro-organisms, no support from ancestors
Rice	No growth value for the baby
Drinking too much water	Baby's joints will be weak
Bone marrow in bones	Baby will have runny nose
Grasshopper and other insects	Baby will have a long head
	Baby can have ruses
	Not allowed by ancestors
Chicken feet	Baby will have 6 fingers
Samp (crushed white maize)	Baby will be skinny
Tomatoes	Causes heartburn to mother
Meat prepared for ceremonies	Considered as unhealthy for a pregnant woman because of several people participating in the eating with different motives and background
Too many fruits in general	Causes excess body weight on the baby

Table 1 above shows a variety of foods that were prohibited and reasons for doing so. It was concluded that Namwala district had a variety of food that were considered taboo when consumed by a pregnant mother and none adherence would affect the mother but most significantly the unborn child. Some of the foods avoided by the respondents as being unhealthy are evidence based. These foods and the women's perceived reasons for avoidance are shown in the next two tables, 2 and 3.

Reasons for Avoiding Fatty Foods on the Unborn Baby

The study sought to find out the reason for avoiding fatty foods by pregnant women and the perceived effect on the baby. Table 2 below has the data as shown.

Table 2. Effect of Fatty Foods on the mother and the Unborn Baby

Effect on mother and baby	**Number**	**Percentage**
Affect the skin of the unborn baby	15	19%
Baby will be born with no hair	4	6%
Baby will have jaundice.	3	4%
Fat baby and contributing to prolonged labour and difficult delivery	44	60%
Pregnancy illness (nausea and vomiting, abdominal pain, headache, and fever) and food aversions	8	11%
Total	74	100%

Source: Research finding, 2023

Table 2 above show the perceived effects for avoiding fatty foods. A frequency of 19% (n=15) stated that the unborn child's skin would be affected, 6% (n=4) stated that the baby would be born without hair, 4% (n=3) said that the baby would have jaundice, 60% (n=44) said that the baby would be fat and that can contribute to prolonged labour. Lastly, 11 % (n=8) believed that said that they would experience problems such as nausea and vomiting, abdominal pain, headache, fever and food aversions.The most significant belief observed in this table was that of having a fat baby that would contribute to prolonged labour and difficulties in labour.

Table 3. Reasons for Avoiding Alcohol and Caffeinated Drinks During Pregnancy

Alcohol Effect on mother and baby	Percentage	Caffeinated Drinks Effect on mother and baby	Percentage
Baby will be a drunkard	27%	Causes abortion or miscarriage	20%
Baby will be disabled	13%	Burns baby skin	14%
Baby will be sickly	16%	Acid will harm the baby Baby will be unhealthy	19%
Baby will have brain damage	9%	Increases blood pressure	27%
Baby will be slow in thinking and drowsy at birth	35%	Reduction of milk production when baby is born	20%
Total	100%		100%

Source: Research finding, 2023

Table 3 presents reasons given by the women for avoiding both caffeinated drinks and alcohol during pregnancy. It was concluded that there were different reasons for avoiding the named foods. The most significant one for alcohol was that the baby would be slow in thinking and would be drowsy at birth. The most significant one for caffeinated drinks being an increase in blood pressure (hypertension).

Reasons for Adherence to the Food Taboos

The major reasons for adherence to food are illustrated in Figure 5.

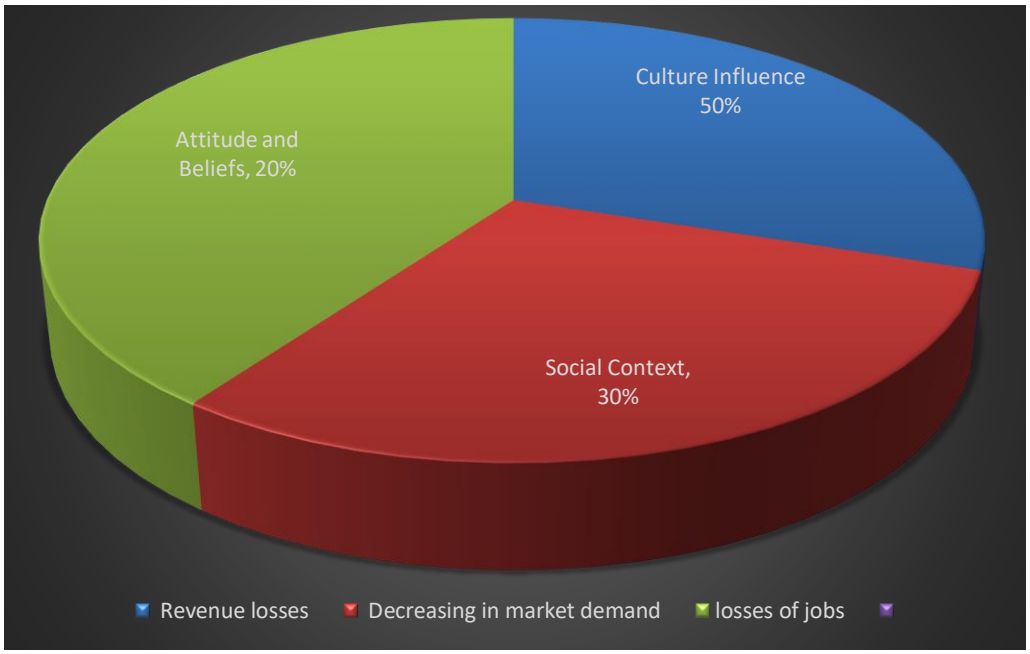


Figure 5. Showing Reasons for Adhering to Food Taboos

Source: Research finding, 2023

Figure 5 shows that 50% (n=37) of respondents adhered to food taboos because of culture, 30% (n=22) adherence to food taboos was social and 20% (n=15) adherence to food taboos was attitude and belief. It was concluded that the main reason or factor for adherence to food taboos was culture.

Discussions of Findings

Namwala District had a variety of foods that were considered taboo when consumed by a

pregnant woman and none adherence would affect the mother but most significantly the unborn child. This is supported by a study that was conducted under FAO on Food Based Approaches, where it was found that most communities, whether rural or urban, had taboos regarding food abstinence during pregnancy with reasons to justify abstinence [22].

Each abstinence in the rural part of Namwala District of Zambia had own reason(s) in relation to health outcome. Some of the taboos can have health benefits, but a number of them had significant nutritional and health costs for mothers and the developing foetus. As a result, understanding local food taboos in relation to pregnancy is an important public health goal, particularly in rural areas in order to strategize on counselling and campaign messages. The negative attitude by health workers would also improve as such counselling and campaigns are implemented [17].

This study found that one of the reason for adhering to food taboos was the connection to ancestral spirits and the fact that older generations did not have problems in having many children and the experience of miscarriages was rare. Therefore, cultural advice was very important for positive pregnancy outcomes. This is in line with a study that was conducted in West Malaysia. The study discovered that women adhered to food taboos to maintain harmony with natural and supernatural entities and to avoid misfortune and calamity [19].

Non consumption of legumes did not come out clearly in this study of Namwala district. In comparison, some Ghanaian communities, avoid all cassava-based foods, corn dough porridge to ensure that they give birth to healthy babies.

Pregnant women in Namwala were skeptical about the inclusion of forest protein such as rabbit and mice because of viewing them as unhealthy foods which would cause abnormal opening of the baby's eyes. This concedes with most western cultures, where mice is considered unclean, as it carries plague and other microorganisms, hence not fit for food. Mice, on the other hand, are popular in rural Thailand, Vietnam, and some African countries, including Zambia, among populations from Eastern Province and not from Southern Province where the study was conducted [30].

The American Heart Association reported in its study on food restrictions in Hong Kong that to maintain body harmony, pregnant women needed to avoid selection of foods that included pineapple, as doing so produced a "poisonous" and negative energy which manifested itself as allergic reaction on the skin of the baby. The baby would experience skin eruptions because of this poison and negative energy [2]. The study in Namwala had similar observations in that pineapple was perceived to cause rushes on a foetus to the extent of causing a miscarriage.

Reasons for Adherence to Food Taboos

Different cultures have different values, beliefs and practices. A woman's cultural background affects her needs and expectations during pregnancy and childbirth. The findings of this study were that 50% of the participants did not want to be in conflict with their culture and hence did not eat certain foods. Therefore, culture had an influence on diet during pregnancy. This was observed in other studies from Ghana, Kenya and WHO [10, 17, 19, 22].

Socio-economic Status (SES) was among the factors associated with pregnancy outcomes. The women in Namwala did not have many alternatives to foods that were allowed culturally because of not having enough money for such alternatives. Low Social-economic Status can increase the risk of adverse pregnancy outcomes. Previous studies conducted by the American Heart Association revealed that Low SES is associated with pregnancy complications such as abortion, constipation, preterm delivery, preeclampsia, eclampsia, and gestational diabetes [2]. The findings of this study showed a frequency of 52% (n=38) being unemployed, 39% (n=29) being self-employed and 9% (n=7) being in formal employment.

Culture, as already alluded to, was the main reason for sticking to food taboos in this study. Other studies have confirmed that pregnancy restrictions have both positive and negative effects on health and that, while some of the reasons for food taboos are trivial and sometimes based on speculative reasoning, they persist due to fear of the perceived consequences. It is believed that the spirits of the forefathers live very closely with the living, hence ensuring that genealogical values are upheld [2, 23].

Whether scientifically correct or not, food taboos are frequently intended to protect individuals, and the observance entails abstaining from foods perceived as causal agents for illnesses, allergies, and deformation as well as altered behavior [7], [10]. This study revealed that the people in the rural areas of Namwala enjoyed togetherness because of maintaining values associated with food taboos.

Effect of Fatty Foods on the Unborn Baby

The study found that there were many reasons put across as effects to the unborn baby because of consumption of fatty foods, the most significant being having a fat baby that would contribute to prolonged labour and difficulties in delivery. This assertion was supported by a study that was conducted in rural population of Pondicherry. Embracing food taboos in this area was emphasised with the belief that breaking them would harm the unborn baby or threaten the health of the mother at the time of giving birth [14].

Obesity during pregnancy has been reported to pose a number of risks to a pregnancy with negative maternal outcomes [5]. Therefore, eating in moderation and paying attention to food portions is important for pregnant women.

Effect of Alcohol and Caffeinated Drinks on the Unborn Baby

The reasons of avoiding alcohol were that the baby would be disabled, become a drunkard, would be sickly and the most significant reasons being having brain damage, slow in thinking and drowsy at birth. WHO cautions pregnant women to avoid drinking alcohol during pregnancy as it can cause Foetal Alcohol Spectrum Disorders (FASDs) [10].

Avoidance of caffeinated drinks by pregnant women in Namwala was because of the belief that it would cause miscarriage, reduce milk production for the baby and the most significant reason being hypertension. Maternal caffeine consumption during pregnancy, even in modest amounts (50 mg or one-half cup of coffee per day), has been associated with lower birth weight and higher rates of birth weight below 2500 g [13].

Some women in Namwala, held to food taboos because of their own bad experience which was associated to food taboos. Others believed that holding to these taboos was a symbol of respect for elders.

Traditional beliefs may influence women to disobey the recommendations or advice from health care practitioners. This was observed in a study conducted in Papua New Guinea on missed opportunities on maternal education [31]. Many studies have attested to the fact that consumption of selected foods and avoidance of the perceived food taboos by participants in related studies, is as a result of believing that their health and that of their unborn children would improve [6], [9]. It is actually one guarantee that having a healthy diet during pregnancy can result into a healthy pregnancy and better childbirth.

Conclusion

The people of Namwala upheld their traditions, cultures, and religious convictions in all aspects of life. High levels of poverty and illiteracy among the respondents contributed to poor food choices. This study's main goal was to find out if there were any dietary habits practiced in the three main settlements of Namwala namely, Namwala Central, Koopa, and Chikwata.

The results in this study showed widespread practice of food taboos during pregnancy and

that culturally imposed food restrictions on expecting women prevented them from consuming basic, locally available meals. Some of the participants revealed that they did not fully understand why some foods were prohibited because they were inherent in those communities.

Recommendations for the Study

1. There is a need for strengthening the nutrition counselling components of antenatal care follow-up, to dispel unhealthy traditional beliefs.
2. There is need to develop a team of Community caregivers which should include the traditional leadership who are the custodian of culture so that they can help in breaking the barrier of food taboos in maternal nutrition.
3. The Ministry of Community Development and the Ministry of Health to conduct dramatized community educating campaigns to pregnant women and members of the community on the importance of adhering to maternal nutrition and health.
4. The Ministry of Education can develop and promote maternal nutritional education awareness programmes in the school curriculum in order to provide this important knowledge to school going children for future reference.
5. Antenatal Clinics to include a Health feeding programme where pregnant women attending ante-natal can be exposed to good food choices and selection, cooking methods and nutritious meals.

Acknowledgements

We acknowledge the District Health Office for permission to collect data. The health staff in Namwala District for providing conducive atmosphere to collect data and most profoundly, the women who were selected as study sample; for being available to provide the needed information.

This study would have been impossible without the contributions from the research team and the participants.

Conflict of Interest

We declare that we do not have any conflict of interest.

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Bacteriology of Urinary Tract Infection in Children Attending Federal Staff Hospital in Abuja

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Abstract

Urinary tract infection (UTI) is a term applied to a variety of clinical conditions ranging from asymptomatic presence of bacteria in the urine to severe infection of the kidney with resultant sepsis. The study was designed to identify the bacteria associated with urinary tract infection among children attending Federal staff hospital, Abuja and to ascertain their antibiogram. Mid-stream urine samples were collected from the subjects enrolled into the study and were cultured into Cysteine Lactose electrolyte deficient medium and Blood agar and incubated appropriately. The plates were read and isolated were subjected to biochemical reactions and antibiogram were carried out on pathogenic organisms. The results showed the overall prevalence of 10.8% urinary tract infections among the studied subjects. The females subject had the highest prevalence of 91.7% while the male counterpart recorded 8.3%. The age groups 1-5 years had the highest prevalence of 50.0% while least prevalent of 16.7% were recorded by age group 6 to 10 years old. Escherichia coli was the highest isolated with 51.7% while Proteus Species and Streptococcus faecalis recorded the prevalence of 2.5% respectively. This study concluded that urinary tract infections is very common among children attending Federal staff hospital in Abuja.

Keywords*: BA- Blood agar, CLED-Cysteine Lactose, Electrolyte deficient medium, FSH-Federal Staff Hospital, UTI- Urinary Tract Infection.*

Introduction

Urinary tract infection (UTI) is an infection in the urinary tract involving the ureters, bladder or kidney(s) and the urethra. These are the structures that urine passes through before being eliminated from the body [1].

It is understood that the infection targets the different parts of the urinary tract and consequently result in the contagion of the lower and the upper urinary tracts. The infection is named based on the site of infection.

The infection of urethra and ureter are referred to as urethritis and urethritis respectively whereas cystitis and pyelonephritis corresponds to bladder and kidney infections [2] Cystitis is a common type of infection whereas the infection associated with the renal damage is an issue of serious concern. Therefore, the infection of bladder and urethra are referred as the infection of the lower urinary tract whereas the kidney and ureter infection is an indication of upper tract infection. Generally, UTIs are classified based on the factors that trigger the

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infection and the nature of occurrence. Taking these aspects in to consideration, UTIs can be classified as follows:

1. Uncomplicated or complicated (based on the factor that triggers the infection).
2. Complicated urinary tract infection occurs in men and women at any point of their life and has the tendency to produce severe outcomes resulting in death under serious circumstances. These infections are highly intricate and are difficult to treat and they are persistent. These complicated urinary tract infections can lead to outcomes like structural anomalies that blights that capability of urinary tract to flush out the urine and this in turn provides better scope for the growth of bacteria as urine is a suitable growth medium and lead to dire consequences. Patients with urinary tract infection are often subjected to medical devices and one such device.

UTI are among the most common bacterial infections in human both in community and hospitals settings and occur in all age groups and sexes [3]. It is an infection which is a leading cause of childhood morbidity and mortality and is one of the commonest causes of renal diseases in childhood of one year to six years of age [4].

UTI is a term applied to a variety of clinical conditions ranging from asymptomatic presence of bacteria in the urine to severe infection of the kidney with resultant sepsis [5] UTI is defined also as the growth of a known bacterial pathogen more than 1000 cfu/ml in association with a positive dipstick or urinalysis [6].

According to The National Institute for Health and Clinical Excellence (NICE) guidelines, urinary tract infection is defined by a combination of clinical features and presence of bacteria in urine [7]. The Clinical symptom of UTI usually includes frequency, dysuria, pyuria, abdominal pain, back pain, fever, or urgency [8].

The prevalence of urinary tract infection varies markedly with sex and age. Malnutrition, poor hygiene, low social-economic status is also associated with UTI. Infection may occur at many places along the genitourinary tract: urethra, bladder, ureter, renal, pelvis or parenchyma as represented in different sexes and in children below. The farther up in the urinary tract the infection is located, the more serious it is [9]. In the United States, urinary tract infections account for more than 7million visits to medical offices and hospitals each year. Urinary tract infections are much more common in adults than in Children, but about 1-2% of Children do get urinary tract infections. Urinary tract infections in children are more likely to be serious than those in adults and should not be ignored (especially in younger children) [1]. These infections are much more common in girls and women than in boys and men younger than 50 years of age. The reason for this is not well understood, but anatomic differences between the genders (a short urethra in women) might be partially responsible. About 40% of women and 12% of men have a urinary tract infection at some time in their life [10].



Figure 1. Female Urinary Tract

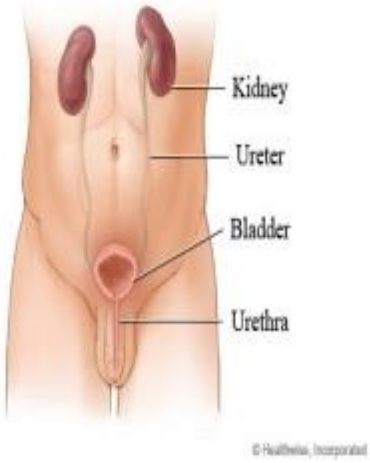

Figure 2. Male Urinary Tract

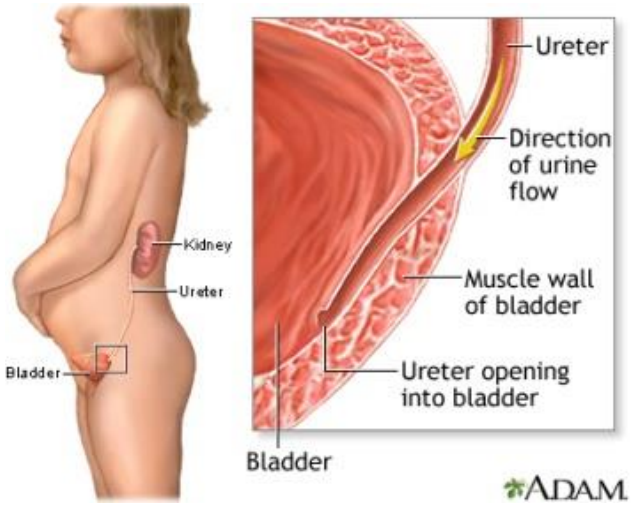

Figure 3. Vesicoureteral Reflux

Purpose of the Study

1. To study bacteria involved in UTI in children attending Federal staff hospital (FSH), Federal Secretariat, Abuja.
2. To identify the common bacteria associated with UTI in children attending FSH.
3. To relate the prevalent of UTI to age groups and sex.

Possible Treatment Pattern

Problem to be Solved

1. Urinary tract infection is the common urinary tract problem in children besides bedwetting.
2. Also, nuclear renal scans suggest that the vast majority of febrile young children with UTI have pyelonephritis putting them at risk for renal scanning and the long term sequel of hypertension and renal failure [6].
3. It is imperative that physicians identify these children to institute early treatment, evaluate the urinary tract, and monitor for recurrent UTI [7].
4. It is understood that the infection targets the different parts of the urinary tract and consequently result in the contagion of the lower and the upper urinary tracts. The infection is named based on the site of infection.

5. The infection of urethra and ureter are referred to as urethritis and urethritis respectively whereas cystitis and pyelonephritis corresponds to bladder and kidney infections [11] Cystitis is a common type of infection whereas the infection associated with the renal damage is an issue of serious concern. Therefore, the infection of bladder and urethra are referred to as the infection of the lower urinary tract whereas the kidney and ureter infection are an indication of upper tract infection. Generally, UTIs are classified based on the factors that trigger the infection and the nature of occurrence. Taking these aspects in to consideration, UTIs can be classified as follows:
   a) Uncomplicated or complicated (based on the factor that triggers the infection) Gender is an important factor in UTI [2]. Sex shows preponderance of UTI in boys during the first year of life, but after the first year of life more girls than boys have UTI [5].
   b) The risk of bacteriuria, follow up studies show that individuals who have childhood UTIs continue to be at risk of adult UTIs whether they have Vesical urethral reflux, in a study in the University Hospital in Bern, Switzerland, from vagina to the urethra, only small percentage of teenage girls and women appear to be at risk from intercourse associated infection [8]Circumcision is one of the oldest surgical procedures in the world, it is Performed for religious, social, and medical reasons, its prevalence varies widely among different ethnicities and cultures [9] Many studies have suggested an association between UTI and the uncircumcised state, although these studies have been criticized on the methodological grounds a recent case control study on 144 children under 5 years of age showed that circumcision was strongly associated with a decreased risk of symptomatic UTIs [10].

Causative organisms of UTI

Bacteria

1. Most of urinary tract infections are caused by Gram-negative bacteria like *Escherichia coli, Klebsiella species, Proteus mirabilis, Pseudomonas aeruginosa, Acinetobacter, and Serratia.* 90%of UTI cases are caused by gram-negative bacteria while only 10% of the cases are caused by gram-positive bacteria. Gram-positive bacteria include *Enterococcus, Staphylococcus, Streptococcus agalactiae [*13]. E*scherichia coli* are the most common gram-negative bacteria responsible for UTI [14] At least 75% to 87% of UTI cases.
2. *Escherichia coli* At least 80% of the uncomplicated cystitis and pyelonephritis are due to *Escherichia coli* [5] Whereas *Proteus mirabilis* and *Klebsiella pneumonia* infections accounts 10%, 6% respectively [10] Adherence properties of some organisms prevent the normal washout for these organisms by bladder emptying and mucosal host defense mechanisms. *Escherichia coli* are virulent due to the presence of P. fimbriae, organelles on its strains that may attach or adhere on specific receptors of uroepithelial cells and interfere with the washout of bacteria [5] *Escherichia coli* are predominant in girls, whereas *Proteus mirabilis* and *Klebsiella pneumonia* are likely encountered in boys [10] High incidence of UTI due to *Proteus* spp., *Klebsiella* spp. and *Enterobacter* spp. Infections are more common among children with recurrent UTIs and in those treated with antibiotic prophylaxis. Whereas other uropathies' like *Pseudomonas, Serratia* and *Candida* are more common among children with urogenital abnormalities [16] 78% of community-acquired UTI are due to *Escherichia coli* and 12% by *Klebsiella*; whereas in hospital

acquired UTI 65% are caused by *Escherichia coli* and other pathogens, including *Pseudomonas* [17].

Fungal UTI

Urinary tract infection may be caused by Fungi and Virus. Fungi, such as Candida, is the second most cause of Nosocomial UTI in patients it can be spread systematically and can be life threatening. Fungi infections are seen in infants and children who are on long-term antibiotics, patients who are Immunocompromised, or patients using invasive devices like IVs, grains and Candida [13] Fungi infections are more prevalent in children with Urinary tract Anomaly (UTA) [15] it is associated with infections after instrumentation of the urinary tract [13] The prevalence rate 27.2% [11]Treatment of Candiduria includes stopping antibiotics, removing or changing indwelling catheters, and starting antifungal agents like oral fluconazole, parental or intravesical amphotericin B [2].

Viral UTI

Viral UTI can be caused by Adenovirus types 11 and 21, polyomavirus, BK, and herpes simplex viruses [4].

Mode of Bacterial Entry

There are two modes of bacterial entry into the genitourinary tract. The ascending route and the hematogenous route.

The Ascending Route: Most cases of pyelonephritis are caused by the ascent of bacteria from the bladder, through the ureters and into the renal parenchyma [5] Most cases of UTIs are caused by bacteria ascending from the perineum [6].

Hematogenous Route: This type usually occurs in neonates and immunocompromised Patients [5] At first 8 to 12 weeks of life urinary tract infection may be secondary to hematogenous source. Because of that, the diagnosis of UTI in young children is very important as it is considered a marker for urinary tract abnormalities in newborns. UTI from nematogenous source may be associated with bacteraemia [16] Staphylococcus aureus, Candida species, and Mycobacterium tuberculosis are common pathogens that travel through the blood to infect the urinary tract [5].

Pathogenesis of UTI

Circumcision status in males, peri-urethral flora, micturition disorders, bowel disorders, local factors, and hygienic measures are important factors involve in the pathogenesis of UTI [8]The main long term consequence of UTI is renal scarring which may lead to hypertension and end-stage renal disease [2] Of the 3% of girls and 1% of boys who contract a prepubertal UTI, 17% or more have infection-related renal scarring, 10% to 20% may become hypertensive, but only a rare child has progressive renal dysfunction culminating in end-stage renal disease [14] The pathogenicity of bacteria in UTIs is influenced by both bacterial and host factors like bacterial adhesion and motility, in addition to host immune response and genetic factors [6].

Existing Solutions

1. It is very important to recognize and treat UTI rapidly. Treatment of UTI with the appropriate antibiotic can minimize mortality, morbidity, and any renal damage from acute UTI. Choosing the appropriate antimicrobial agents sounds difficult, but advances in the introduction of new antimicrobial agents have allowed physicians to appropriately tailor specific treatment for each patient [5].
2. Treatment of UTI depends on the age of patient, location of infection, etiology of the disease, degree of illness in the patient, efficacy of antibiotic and resistance profile within the community [13].
3. The main treatment of UTI is to initiate appropriate antibiotic therapy promptly. Most organisms causing UTI to originate from the gastrointestinal tract; the most common of them is *Escherichia coli.*

Antibiotics prescribed must be active against these organisms, in cases where the patients are seriously ill broader spectrum of antibiotics must be used.

4. The majority of patients respond to oral antibiotics, but in some cases intravenous antibiotics must be used, these cases are seriously ill or septic patients, children less than 1 month of age, and in the case of vomiting. The duration of traditional treatment with antibiotics is 7-10 days in acute pyelonephritis, whereas in lower tract UTI short course treatment from 3-4 days is effective in clearing the infection [2].
5. Antibiotics used in the treatment of UTI must be active against urinary pathogens with low rate of resistance, to be free of side effects, palatable, sugar-free preparations, available, and having no effect on normal gut flora [7].
6. Antibiotics used in treatment of UTI include:

Sulphamethoxazole/ Trimethoprim, Fluroquinolones (e.g Ciprofloxacin), Nitrofurantoin, Aminoglycosides (e.g Gentamicin, Amikacin), cephalosporin and Aminopenicillins (e.g Ampicillin and Amoxycillin) [5]. Trimethoprime/ Sulphamethoxazole, Cephalosporin's and amoxicillin-clavulanate are the most acceptable antibiotics for the treatment of UTI in pediatrics in comparison to quinolones, which has an effect on joint development, and first line therapy of amoxicillin which has a high prevalence of resistance to *Escherichia coli* in many communities [6].

Since antibiotics are given empirically, it is necessary to access the distribution and susceptibility of the microorganisms in each case. In addition, there should be a periodic re-evaluation for UTI treatment policies in children every 5 years [2, 9]. Antibiotics are not recommended for initial empirical therapy when their resistance rate≥10-20% [10].

Resistance to commonly used antibiotics was found to be very high among the isolates due to prolonged use of antibiotics and this could damage periurethral flora, allowing uropathogens to colonize and subsequently to infect the urinary tract, leaving clinicians with very few choices of drugs to another depending on antibiotic use. Trimethoprim-sulphamethoxazole is commonly used to treat many UTIs, except those caused by *Enterococci* and *Pseudomonas* spp.it interferes with the bacterial metabolism of folate. It is highly effective and relatively inexpensive [5]. The use of TMP-SMX has declined due to the increased incidence of bacterial resistance [5] A study was conducted in northern Isreal, it was shown that ampicillin, cephalexin and TMP-SMX cannot be used empirically in the treatment of community-acquired UTI as the incidence of bacterial resistance has increased for these antibiotics [8].

The prevention and control of urinary tract infections:

1. Drink plenty of liquids, especially water that helps dilute your urine and ensures that you will urinate more frequently allowing bacteria to be flushed from your urinary tract before an infection can begin.
2. Wipe from front to back: Doing so after urinating and after a bowel movement helps prevent bacteria in the anal region from spreading to the vagina and urethra.
3. Empty your bladder soon after intercourse: Also, drink a full glass of water you help flush bacteria.

Avoid potentially irritating feminine products: Using deodorant sprays or other feminine products, such as douches and powders, in the genital, they can irritate the urethra.

Materials and Methods

Study Area

The Study Area is Federal Staff hospital, Annex l, ground floor, Laboratory unit in phase one of the Federal Secretariat, in Abuja, Federal Capital Territory in Abuja Municipal Area, Council. (AMAC) located at the Abuja central business District as shown in Appendix 1, Figure

4, (The building) showing the study Area of where the study was carried out.

Ethical Clearance

Ethical clearance was sought and obtained from the institution review body before commencement of the study.

Study Duration

The study was carried out within the fellowship programme approved by the Medical Laboratory Council of Nigeria (MLSCN).

Sample Size Determination and Sampling

The minimum sample size was calculated based on the general formula as described by Fisher *et.al.,* (1991) and Thrust field, (2005).

$$N = Z^2P\ (1-P)/d^2$$

N = Sample size.

Z = 1.96(Standard error at 95CL).

P = Prevalence of (15%).

D = Level of prevalence at 5% ($p<0.05$, $p>0.05$).

$$N = Z^2P\ (1-P)/d^2$$

$$N = \frac{(1.96)^2 \times 0.15\ (1-0.25)}{0.05^2}$$

$$N = \frac{3.841 \times 0.1275}{0.0025} = 195.891$$

Using the above formula, the minimal size is 195 but a total of 300 samples was collected. Sample size greater than the value determined by the formula, was used to improve precision estimates of the study.

Study Population

Urine Samples was randomly collected from a total of 300 children between the ages of 1 to 15 years.

Inclusion Criteria

Children attending Federal Staff clinic, Abuja with symptoms of urinary tract infection.

Exclusion Criteria

Children attending Federal Staff clinic currently on antibiotics.

Sample Collection

Clean-catch midstream urine was collected into sterile universal bottles given to parents or Guardians of the subjects and transported to the Laboratory immediately in ice packed bags for processing but if delay is inevitable, they are refrigerated to ensure that there is no proliferation of microorganism if at all there was any or further contamination which might lead to false reading. Alternatively, a measured amount of boric acid powder (0.1g/10ml of urine) would be added to preserve the specimen, and thoroughly mixed. White cells, red cells, and casts are also well preserved, and there is no interference in the measurement of urinary protein and glucose. Bactericidal chemicals such as thymol, bleach, hydrochloric acid, acetic acid, or chloroform was not used as a preservative for urine culture.

Sample Analysis

Macroscopic examination of the urine, the colour and appearance of the urine was examined. Normal freshly passed urine is clear straw or light yellow in colour. More concentrated urine appeared as dark yellow. When left to stand, cloudiness developed due to the precipitation of urates in acid urine or phosphates and carbonates in alkaline urine. Urates may have given the urine a pink- orange colour.

Microscopic Examination

Wet Preparation of fresh uncentrifuged urine: three loopfuls of well-mixed fresh urine was placed on a slide and covered with a cover glass; the preparation was examined using the 10x and 40x objectives.

Results

The following was found in the urine: - bacteria, pus cells, red blood cells, epithelial cells, yeast cells, crystals, casts, *Trichomonas vaginalis*, *Schistosoma haematobium*, and other parasites.

Cultivation

Standard quantitative culture was carried out. A loop calibrated to deliver approximately 0.001ml was used to inoculate blood agar and Cysteine lactose electrolyte- deficiency (CLED) medium which is a non-inhibitory medium.

The urine sample collected was thoroughly mixed and a sterile standard wire loopful was used to inoculate the urine specimen onto CLED and Blood agar medium. The media was incubated aerobically at 37◦c for 24 hours.

Microscopy Examination

Two 2mls of urine specimen was placed into a centrifuge tube and centrifuged at 10,000 rpm for 5minutes.The supernatant was discarded into a jar with disinfectant added and the sediment was examined under ×10 and ×40 objectives.

Culture Plate Reading

The culture media was macroscopically examined for colour, size, shape, edge, elevation, emulcifiability, hemolysis and lactose fermentation. Determination of significant bacteriuria: Bacterial growth on the culture media was determined for significant bacteriuria using Significant bacteria=>10^5orgs/ml.

Bacterial Identification

Each significant colony was using biochemical test to identify the bacteria in the urine specimen using the following.

Gram Staining Technique

1. A drop of normal saline will be placed on a clean grass slide with a sterile wire loop and a colony of organism will be emulsified in the saline, the smear will be allowed to air-dry.
2. The smear will be heat fixed by passing it through a uniform flame three times.
3. The slide will be placed on a staining rack and Crystal violet applied for one minute after which it will be flooded with running tap water.
4. Lugol's iodine test will be applied for one minute. The smear will be allowed to decolorize immediately using acetone few seconds and flooded with water immediately.
5. Natural red will be applied for a minute. The slide will then be rinsed with water and the back of the slide wiped with clean cotton wool and allowed to air-dry.
6. Using oil immersion objectively, the stained smear will be examined microscopically, and the result recorded appropriately.

These procedures was carried out for all the colonies obtained.

Biochemical Analysis

A biochemical test will be carried out to identify the organism. These includes oxidase, indole, citrate utilization, urease production, motility for Gram negative organisms, while catalase and coagulase was conducted on Gram positive organisms.

Catalase Test

Principle: This test is used to differentiate those bacteria that produce the enzyme catalase, such as Staphylococci, from non-catalase producing bacteria such as Streptococci.

Procedure

1. A loop full of normal saline was placed on a clean grease free, Glass slide using a sterile wire loop and a portion of a colony of organism was emulsified in the saline.
2. A drop of 3% hydrogen peroxide was added to the suspension.
3. The suspension will be examined immediately for the presence of effervescence. Positive and negative controls will be set up alongside the test.

The presence of effervescence was an indication of Staphylococcus aureus.

Coagulase Test

Principle: this test is used to identify *Staphylococcus aureus* which produces the enzyme coagulase. Coagulase causes plasma to

clot by converting fibrinogen to fibrin. Two types of coagulases are produced by most strains of Staphylococcus aureus:

1. Free coagulase which converts fibrinogen to fibrin by activating a coagulase-reacting factor present in plasma. Free coagulase is detected by clotting in a glass slide.
2. Bond coagulase (clumping factor) which converts fibrinogen to fibrin without requiring a coagulase reacting factor. It can be detected by the clumping of bacterial cells in the test tube.

Tube Test Method (Detects Free Coagulase)

1. Using a graduated Pasteur pipette 0.2mls of plasma was placed into a tube and 0.8ml of the broth culture was added.
2. It was mixed gently and incubated at 37ºc. It was examined for clotting after an hour by tilting each tube gently.
3. Positive and negative controls will be set up alongside the test.

Results

Clumping within 10 seconds -Positive.
No clumping within 10 seconds -Negative.

Indole Test

Principle: testing for indole production is important in the identification of Enterobacteria. Most strains of *Escherichia coli*, *Proteus vulgaris*, *Proteus rettgeri* and *Providencia species* breakdown the amino acid tryptophan with the release of indole.

Produce

1. The organism was inoculated into a bijou bottle containing 3ml of sterile tryptone water.
2. It will be incubated at 37ºc for up to 24hrs.
3. Place 0.5ml of Kovac's reagent into 2ml of the incubated peptone water and shake gently.
4. Positive and negative controls were set up alongside the test.

Results

Red surface layer -Positive Indole test.
No red surface layer- Negative Indole test.

Oxidase Test

The oxidase test is used to assist in the identification of Pseudomonas, Neisseria, Vibrio, Brucella, and Pasteurella species, all of which produce the enzyme cytochrome oxidase. The enzyme oxidase will oxidize tetra-methyl paraphenlyene-diamine-dihydrochloride.

Procedure

1. A piece of filter paper was placed in a clean petri dish and 2 drops of freshly prepared oxidase reagent added.
2. A piece of stick was used to remove a colony of the test organism and smeared on the filter paper.
3. Positive and negative controls were set up alongside the test.

Results

Blue Purple colour- Positive oxidase test.
No blue purple colour- Negative oxidase test.

Citrate Utilization Test

Principle: This test is one of several techniques used occasionally to assist in the identification of enterobacteria. This test is based on the ability of an organism to utilize citrate as its only source of carbon and ammonium as its only source of nitrogen. Citrate is metabolized to acetone and carbon dioxide.

Procedure

1. The organism was inoculated into a bijou bottle containing 3ml of sterile peptone water.
2. And were incubated at 37ºc for 24 hrs.
3. The surface of the citrate slope was inoculated and incubated overnight at 37ºc; a blue color indicates positive result.
4. Positive and negative controls will be set up alongside the test.

Results

Blue colour- Positive citrate test.

Green colour- Negative citrate test.

Urease Test

Principle: This is one of the several techniques used occasionally to assist in the identification of enterobacteria. The enzyme urease decomposes urea by hydrolysis to give ammonia and carbon dioxide. This reaction turns medium alkaline which is shown by a red, pink color.

Antibiotic Sensitivity Test

Disc Diffusion Technique: Antibiotic sensitivity tests was performed by the antibiotic disc diffusion method of Kirby-Bauer on Mueller-Hinton agar plates using the following antibiotics: Augmentin (30ug), Ceftriaxone (30ug), Nitrofurantoin (200ug), Gentamycin (10ug), Cotrimoxazole (25ug), Ofloxacin (5ug), Amoxycillin (25ug), Ciprofloxacin (10ug), Tetracycline (30ug), Pefloxacin (5ug) as described by the NCCLS (16). They will be locally obtained. The culture plates was incubated at 37ºC for 24hrs after which the zone of growth inhibition was measured to the nearest millimeter. The zone of inhibition will be measured to the nearest millimeter using a ruler and classified as sensitive, intermediate, and resistant. These procedures will be carried out for all organisms isolate.

Data Analysis

The Data obtained was entered and analyzed as shown below using statistical package for social science (SPSS) version 17.0. P value of <0.05 was considered statistically significant.

Results

A total of 300 urine samples were examined in this study and 120(40%) had significant bacteriuria. There was no significant bacterial growth in 180(60%) of the samples. There were 240(45.8%) females recruited for the study while 60(16.7%) were males this difference is statistically significant (P<0.05).

Bacterial isolates in this study were *Escherichia coli* 62(21%), followed by *Klebsiella species* 30(10%), *Staphylococcus aureus* 20(7%), *Proteus species* 3(1%), *Streptococcus faecalis* 3(1%), *Pseudomonas aeruginosa* 2(1%). *Pseudomonas aeruginosa, proteus species*, and *Streptococcus faecalis* had the lowest frequency of isolation. In overall, UTI was caused mainly by Gram- negative organisms 97(82.99%) than Gram-positive organisms 23(34.78%) Table 3. Table 1 and 2 showed the prevalence of urinary tract infection in relation to age and sex respectively of patients. Results obtained showed that a high percentage of organisms were isolated from both males and females within the age bracket of 1-5years, 6-10years, and 11-15 years. However, there were more cases in females than males.

Antibiotics susceptibility pattern of the microbial agents isolated (antibiogram) were showed in Table 4. It was observed that Gram-positive isolates *Staphylococcus aureus* was mostly sensitive to Ampicillin, Amoxicillin, Cotrimoxazole, Ofloxacin, Ciprofloxacin, Tetracycline, Gentamycin, Cefuroxime, Erythromycin, while streptococcus faecalis was mostly sensitive to Ofloxacin, Cloxacillin, Erythromycin but were resistant to the following antibiotics as follows, Ampicillin, Amoxicillin, Cotrimoxazole, Ciprofloxacin, Tetracycline, Gentamycin the gram negative isolates were mainly sensitive to Ofloxacin, Cloxacillin, Cefuroxime, Gentamycin and cotrimoxazole the in-vitro sensitive testing showed that all gram-negative isolate were mostly sensitive to Cotrimoxazole, Ofloxacin, Ciprofloxacin, Cefuroxime, Gentamycin, Erythromycin were effective against the Gram-positive organisms, very high proportions of the organisms (Gram-positive and Gram negative were resistant to the following antibiotics, Ampicillin, Amoxicillin, Cotrimoxazole, Ciprofloxacin, Tetracycline, Gentamycin.

Table 1. Age Distribution of Urinary Tract Infection among Children Attending Federal Staff Hospital, Abuja

Age groups	Number Examined	Number Positive	Prevalence (%)
1-5	111	60	50.0
6-10	80	20	16.7
11-15	108	40	33.3
Total	**300**	**120**	**100**

Table 2. Prevalence of Urinary Tract Infection among Children Attending Federal Staff Hospital Abuja in Relation to Sex

Sex	Number Examined	Number Positive	Prevalence (%)
Males	60	10	8.3
Females	240	110	91.7
Total	**300**	**120**	**100**

Table 3. Bacterial Isolate from Urine of Children Attending Federal Staff Hospital, Abuja

Isolates N=300	No. Positive	Prevalence (%)
S. aureus	20	16.6
S. faecalis	3	2.5
E.coli	62	51.7
Klebsiella species	30	25.0
P. species	3	2.5
P. aeruginosa	2	1.7
Total	**120**	**100**

Table 4. Antibiogram of Isolates from Urine of Children Attending Federal Staff Hospital, Jos

ISOLATES	AMP	AMX	COT	OFX	CIP	TE	CN	CEF	ERY
	Pos (%)	Pos (%)	Pos (%)	Pos (%)	Pos (%)	Pos (%)	Pos (%)	Pos (%)	Pos (%)
S. aureus 20	(5.0)	(5.0)	(10.0)	3(15.0)	5(25.0)	2(10.0)	2(10.0)	2(10.0)	2(10.0)
S. faecalis 3	0(0.0)	0(0.0)	0(0.0)	1(33.3)	0(0.0)	0(0.0)	0(0.0)	1(33.3)	1(33.3)
E. coli 62	1(1.6)	1(1.6)	14(22.6)	10(16.1)	3(4.8)	8(12.9)	22(35.5)	30(48.4)	6(9.7)
K. species 30	2(6.7)	2(6.7)	2(6.7)	5(16.7)	6(20.0)	1(3.3)	6(20.0)	5(16.7)	1(3.3)
P. species 2	1(33.3)	1(33.3)	1(33.3)	0(0.0)	0(0.0)	0(0.0)	1(33.3)	0(0.0)	0(0.0)
P. aeruginosa 2	0(0.0)	0(0.0)	0(0.0)	1(50.0)	0(0.0)	0(0.0)	2(100.0)	0(0.0)	0(0.0)

Discussion and Conclusion

Urine is one of the sterile body fluids, but when it is colonized with bacteria, all the structures of the urinary tracts are at risk of being invaded. In this study, twenty-four (24) (9.6%) gave significant growth and no reason for the absence of the bacterial growth recorded in one eighty samples may be since patients were undergoing antibiotics therapy collected from the hospital before coming to the hospital for diagnostics and as such the antibiotics must have inhibited or destroyed the pathogens.

In this study the most predominant organisms isolated among the children attending federal staff hospital in Abuja were Escherichia coli 21% and Klebsiella species 9%. This finding agrees with other reports which indicated that gram negative bacteria mostly E. coli and Krebs. Species are the most common pathogens isolated in patients with UTI.

The prevalence of UTI occurred more in females than males. Of the 120 isolates obtained 110 were from females while 10 were from males. These results also agree with other reports, which shows that UTI's are most frequent in females than males during adolescence and adulthood.

The reason for the absence of the bacterial growth recorded in forth samples may be because patients were undergoing antibiotics therapy collected from the prison yard clinic before coming to the hospital for diagnosis and as such the antibiotics must have inhibited or destroyed the pathogens. Also, a recent case control study on 144 children under 5 years of age showed that circumcision was strongly associated with a decreased risk of symptomatic UTIs. The prevalence of UTI occurred more in females than males of the 141 isolates obtained 96 were from females, while 45 were from males. These also agree with other reports which show that UTI's are more frequent in males than in females.

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Conflict of Interest

The Author declares that there is no conflict of interest.

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The Effect of Total Quality Management on Customer Satisfaction in the Downstream Petroleum Sector in Ghana

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Abstract

Despite the introduction of Total Quality Management (TQM), there is a general observation of customer dissatisfaction surrounding service provision by the companies in the downstream petroleum sector in Ghana. This research sought to assess the impact of TQM on customer satisfaction with regards to the downstream petroleum sector in Ghana. A sample size of 360 respondents, consisting of 290 customers, 60 staffs and 10 management staffs across different companies within Accra was used for the study. The study revealed that successful implementation of TQM has a major and significant impact on customers' satisfaction. TQM relies of the principle of stakeholder participation and involvement. There was however a shortfall with this principle as it was identified that staff of companies within the industry did not adequately involve themselves in rolling out the TQM concept. The study recommends management of the company to ensure full participation of all. The study revealed that the successful implementation of TQM has a significant effect customer satisfaction. However, the principle of participation and involvement by staff in the quality management chain was found not to be encouraging as staffs have not been adequately involved in rolling out the TQM concept in their companies. The study concludes that management of the companies in the sector should ensure full participation of all employees in the implementation of TQM through effective communication mechanisms to integrate quality disciplines into the culture and quality service activities of the company.

Keywords: *Total Quality Management, Downstream petroleum sector, Customer service.*

Introduction

Total Quality Management (TQM) and customer satisfaction are crucial aspects of the petroleum sector in Ghana, as they directly impact the industry's success and competitiveness. TQM is a management approach that focuses on continuously improving the quality of products and services through the involvement of all employees and the integration of various business processes [1]. It aims to enhance customer satisfaction and loyalty by meeting or exceeding their expectation. In the petroleum sector, TQM plays a significant role in ensuring the quality of petroleum products, refining processes, and customer service. TQM principles emphasize the implementation of robust quality control measures to ensure the consistency and reliability of petroleum products [2]. This involves rigorous testing, monitoring, and adherence to quality standards at every stage of the supply chain, from extraction to distribution. In addition to the above, TQM promotes the identification and elimination of inefficiencies, bottlenecks, and waste in petroleum operations. Furthermore, Continuous process improvement initiatives, such as Six Sigma and Lean methodologies, are employed to streamline operations, reduce costs, and enhance the overall quality of processes [3]. TQM encourages the active participation and involvement of all

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employees in quality improvement efforts. This includes training programs, empowerment initiatives, and creating a culture of accountability and responsibility. By engaging employees, organizations can tap into their expertise and ideas to drive innovation and deliver better customer experiences. It can also be argued that TQM extends its focus to suppliers in the petroleum sector. Collaborating closely with suppliers and conducting thorough quality assessments ensures that the raw materials and components used in the petroleum industry meet the required standards. This helps maintain consistency in product quality and reliability. TQM incorporates safety and environmental factors into the petroleum sector's operations. This involves complying with health, safety, and environmental regulations, implementing robust safety management systems, and promoting sustainable practices to mitigate negative impacts on the environment.

Organizations the world over have realised the central role customers play in an organization and as such have taken all steps to enhance customer satisfaction. One of the best-known strategies to achieve this objective is the implementation of Total Quality Management (TQM) [4, 5]. According to [6], TQM is a customer focus and as such its implementation in the telecommunication industry which relies mostly on customer satisfaction is necessary. [7] argued that TQM encompasses a wide range of techniques and tools to ensure total customer satisfaction. This includes International Standards Organization (ISO 9000) series, pareto analysis, matrix diagrams, tree decision diagram, critical path analysis, fishbone diagram etc. [6] further identified six common TQM practices; process management, supplier quality management, customer involvement, committed leadership, cross-functional training, employee involvement. The service sector of any economy like Ghana where downstream petroleum sector plays a critical role is dependent on the interactions of employees and customers [3]. Thus, the effectiveness of the interrelationship between the TQM concept and human resource management is critical and fundamental to the implementation of the TQM concept by oil marketing companies (OMCs) in Ghana. This implies that TQM is applicable not only in the manufacturing industry but in the service sector as well. Customers in the service industry are becoming more sensitive to service quality and service delivery than in manufacturing since customers in the service industry are always in constant contact with front-line service personnel and customer service representatives, which is not the case with factory workers [9].

Historically, there is a lot of literature on the petroleum industry which typically has been fragmented in nature and most explicitly focuses mainly on new topics and in narrative nature without consolidating the previous works to direct future works [10]. Over the years the new empirical research without synergies and systematic review have resulted in disjointed and contradictory research outcomes. These outcomes have not contributed more to research improvement and policy in the petroleum industry over the years hence the motivation of this research is to use total quality management framework to analyse the downstream petroleum sector with an innovative and transparent methodology [11] through an empirical study.

One of the most relied tools in the 21st century that organizations have implemented to improve the efficiency and effectiveness of their operations is Total Quality Management [12, 13]. The implementation of total quality management has been recognised to give companies competitive advantage since the 1980s [14]. Total quality management has been implemented in both manufacturing and service organizations because of its effect on organizational and project success [13, 15]. Previous studies on total quality management practices and organizational success have examined the phenomenon mostly within the context of other service industries and manufacturing organizations with little in the

petroleum sector [13]. Moreover, studies of total quality management have been more skewed towards developed and western economies with little in developing countries despites the enormous benefit the concept offers to businesses in all parts of the world [4, 16].

In terms of the effect of total quality management practices on organizational performance a number of studies have reported a positive impact of total quality management on organizational success and performance [16-20]. On the other hand, some studies have also reported a negative association between total quality management and organizational performance [17, 21]. It must be emphasized that there is little or no evidence of studies on total quality management within the Ghanaian context that links it to customer service. Most of the studies conducted in the Ghana context have focused on implementation and its challenges for total quality management in various sectors in Ghana [2, 12, 14]. To the best of my knowledge the current study is among the few if not the first to examine the effect total quality management practices has on the petroleum sector performance in Ghana. This study addresses these discrepancies in literature by examining the effect of TQM on customer satisfaction in the downstream petroleum industry in Ghana.

The study makes significant contributions to literature, policy and practice. In the area of literature, the study is among the few studies on the application of total quality management framework to analyze an industry like the petroleum sector and as such it contributes to literature in that respect. Also, the study is among the limited studies that will analyse the performance of the downstream petroleum sector using the total quality management framework in Ghana. The results of the study will help companies in the downstream petroleum sector to understand components of total quality management that drive performance in their organizations as well as customer satisfaction. The study results will also help industry players understand critical components of the operations that drive performance and customer satisfaction.

Empirical Review- Components of TQM

Customer Focus

There have been numerous empirical studies conducted on the customer focus component of Total Quality Management (TQM). Here are some key findings from the literature:

Customer focus is positively related to customer satisfaction: A study by [4], found that customer focus positively influenced customer satisfaction in the hotel industry. Similarly, another study by [22], found that customer focus had a positive effect on customer satisfaction in the banking sector. Customer focus is positively related to business performance: A study by [23] found that customer focus had a positive effect on business performance in the manufacturing sector. Another study by [12] found that customer focus had a positive effect on financial performance in the banking sector. Customer focus is positively related to employee satisfaction: A study by [6] found that customer focus had a positive effect on employee satisfaction in the hotel industry. Similarly, another study by [21] found that customer focus had a positive effect on employee satisfaction in the banking sector. Employee empowerment is a key driver of customer focus: A study by [18] found that employee empowerment was a key driver of customer focus in the service industry. Similarly, another study by [7] found that employee empowerment had a positive effect on customer focus in the banking sector. Customer focus is positively related to innovation: A study by [24] found that customer focus had a positive effect on innovation in the manufacturing sector. Similarly, another study by [3] found that customer focus had a positive effect on innovation in the service sector.

Overall, the empirical evidence suggests that customer focus is a critical component of TQM and is positively related to customer satisfaction, business performance, employee satisfaction, innovation, and employee empowerment.

Organizations that prioritize customer focus and implement TQM practices that enhance customer focus are likely to experience significant benefits in terms of customer satisfaction, business performance, and employee satisfaction.

Continuous Improvement

Continuous improvement is a critical component of Total Quality Management (TQM), and there have been several empirical studies conducted on its effectiveness. Here are some key findings from the literature:

Continuous improvement is positively related to business performance: A study by [25] found that continuous improvement practices had a positive effect on business performance in the manufacturing industry. Similarly, a study by [22] found that continuous improvement practices had a positive effect on business performance in the service industry. Employee participation is critical to the success of continuous improvement: A study by [26] found that employee participation was critical to the success of continuous improvement practices in the manufacturing industry. Similarly, a study by [27] found that employee participation was a key factor in the success of continuous improvement practices in the service industry. Continuous improvement is positively related to customer satisfaction: A study by [21] found that continuous improvement practices had a positive effect on customer satisfaction in the hotel industry. Similarly, a study by [28] found that continuous improvement practices had a positive effect on customer satisfaction in the retail industry. Effective measurement and evaluation of continuous improvement practices is critical: A study by [12], found that effective measurement and evaluation of continuous improvement practices was critical to their success in the manufacturing industry. Similarly, a study by [15] found that effective measurement and evaluation of continuous improvement practices was critical to their success in the service industry. Continuous improvement practices can lead to improved employee satisfaction: A study by [12] found that continuous improvement practices had a positive effect on employee satisfaction in the manufacturing industry. Similarly, a study by [29] found that continuous improvement practices had a positive effect on employee satisfaction in the service industry.

Overall, the empirical evidence suggests that continuous improvement is a critical component of TQM and is positively related to business performance, customer satisfaction, and employee satisfaction. Organizations that prioritize continuous improvement and implement TQM practices that enhance continuous improvement are likely to experience significant benefits in terms of business performance, customer satisfaction, and employee satisfaction.

Total Employee Involvement

Total Employee Involvement (TEI) is a crucial component of Total Quality Management (TQM), and several empirical studies have examined its effectiveness. Here are some key findings from the literature:

TEI is positively related to employee performance: A study by [5] found that TEI had a positive effect on employee performance in the service industry. Similarly, a study by [14] found that TEI had a positive effect on employee performance in the manufacturing industry. TEI is positively related to business performance: A study by [30], found that TEI had a positive effect on business performance in the service industry. Similarly, a study by [7] found that TEI had a positive effect on business performance in the manufacturing industry. Effective communication is critical to the success of TEI: A study by [3] found that effective communication was critical to the success of TEI practices in the service industry. Similarly, a study by [9] found that effective communication was a key factor in the success of TEI practices in the manufacturing industry. TEI can lead to improved employee satisfaction: A study by [20]

found that TEI had a positive effect on employee satisfaction in the manufacturing industry. Similarly, a study by [11] found that TEI had a positive effect on employee satisfaction in the service industry. TEI can lead to improved innovation: A study by [3] found that TEI had a positive effect on innovation in the manufacturing industry. Similarly, a study by [8] found that TEI had a positive effect on innovation in the service industry.

Overall, the empirical evidence suggests that TEI is a critical component of TQM and is positively related to employee performance, business performance, employee satisfaction, and innovation. Effective communication is a key factor in the success of TEI practices, and organizations that prioritize TEI and implement TQM practices that enhance TEI are likely to experience significant benefits in terms of employee and business performance.

Leadership Commitment

Leadership Commitment is a key component of Total Quality Management (TQM), and several empirical studies have examined its effectiveness. Here are some key findings from the literature:

Leadership Commitment is positively related to organizational performance: A study by [26] found that leadership commitment had a positive effect on organizational performance in the manufacturing industry. Similarly, a study by [31] found that leadership commitment had a positive effect on organizational performance in the service industry. Leadership Commitment is positively related to employee satisfaction: A study by [11] found that leadership commitment had a positive effect on employee satisfaction in the manufacturing industry. Similarly, a study by [6] found that leadership commitment had a positive effect on employee satisfaction in the service industry. Effective communication is critical to the success of Leadership Commitment: A study by [1], found that effective communication was critical to the success of leadership commitment practices in the manufacturing industry. Similarly, a study by [13], found that effective communication was a key factor in the success of leadership commitment practices in the service industry. Leadership Commitment can lead to improved customer satisfaction: A study by [32] found that leadership commitment had a positive effect on customer satisfaction in the service industry. Similarly, a study by [16] found that leadership commitment had a positive effect on customer satisfaction in the manufacturing industry. Leadership Commitment can lead to improved innovation: A study by [12] found that leadership commitment had a positive effect on innovation in the manufacturing industry. Similarly, a study by [33] found that leadership commitment had a positive effect on innovation in the service industry.

Overall, the empirical evidence suggests that Leadership Commitment is a critical component of TQM and is positively related to organizational performance, employee satisfaction, customer satisfaction, and innovation. Effective communication is a key factor in the success of Leadership Commitment practices, and organizations that prioritize Leadership Commitment and implement TQM practices that enhance Leadership Commitment are likely to experience significant benefits in terms of organizational and employee performance, customer satisfaction, and innovation.

Process Management

Process Management is a key component of Total Quality Management (TQM), and several empirical studies have examined its effectiveness. Here are some key findings from the literature:

Process Management is positively related to operational performance: A study by [8] found that process management had a positive effect on operational performance in the manufacturing industry. Similarly, a study by [1] found that process management had a positive effect on operational performance in the service industry.

Process Management is positively related to customer satisfaction: A study by [33] found that process management had a positive effect on customer satisfaction in the manufacturing industry. Similarly, a study by [28] found that process management had a positive effect on customer satisfaction in the service industry. Effective communication is critical to the success of Process Management: A study by [16] found that effective communication was critical to the success of process management practices in the manufacturing industry. Similarly, a study by [5] found that effective communication was a key factor in the success of process management practices in the service industry. Process Management can lead to improved innovation: A study by [22] found that process management had a positive effect on innovation in the manufacturing industry. Similarly, a study by [14] found that process management had a positive effect on innovation in the service industry. Process Management can lead to improved quality: A study by [18] found that process management had a positive effect on quality in the service industry. Similarly, a study by [20], found that process management had a positive effect on quality in the manufacturing industry.

Overall, the empirical evidence suggests that Process Management is a critical component of TQM and is positively related to operational performance, customer satisfaction, innovation, and quality. Effective communication is a key factor in the success of Process Management practices, and organizations that prioritize Process Management and implement TQM practices that enhance Process Management are likely to experience significant benefits in terms of operational and customer performance, innovation, and quality.

Supplier Management

Supplier Management is a key component of Total Quality Management (TQM), and several empirical studies have examined its effectiveness. Here are some key findings from the literature:

Supplier Management is positively related to product quality: A study by [2] found that supplier management had a positive effect on product quality in the manufacturing industry. Similarly, a study by [12] found that supplier management had a positive effect on product quality in the service industry. Effective communication is critical to the success of Supplier Management: A study by [14] found that effective communication was critical to the success of supplier management practices in the manufacturing industry. Similarly, a study by [16] found that effective communication was a key factor in the success of supplier management practices in the service industry. Supplier Management can lead to improved supplier performance: A study by [33] found that supplier management had a positive effect on supplier performance in the manufacturing industry. Similarly, a study by [17] found that supplier management had a positive effect on supplier performance in the service industry. Supplier Management can lead to improved customer satisfaction: A study by [33] found that supplier management had a positive effect on customer satisfaction in the manufacturing industry. Similarly, a study by [28] found that supplier management had a positive effect on customer satisfaction in the service industry. Supplier Management can lead to improved organizational performance: A study by [2] found that supplier management had a positive effect on organizational performance in the manufacturing industry. Similarly, a study by [18] found that supplier management had a positive effect on organizational performance in the service industry.

Overall, the empirical evidence suggests that Supplier Management is a critical component of TQM and is positively related to product quality, supplier performance, customer satisfaction, and organizational performance. Effective communication is a key factor in the success of Supplier Management practices, and

organizations that prioritize Supplier Management and implement TQM practices that enhance Supplier Management are likely to experience significant benefits in terms of product quality, supplier performance, customer satisfaction, and organizational performance.

Measurement and Analysis

Measurement and Analysis is a key component of Total Quality Management (TQM), and several empirical studies have examined its effectiveness. Here are some key findings from the literature:

Measurement and Analysis is positively related to organizational performance: A study by [22], found that measurement and analysis had a positive effect on organizational performance in the manufacturing industry. Similarly, a study by [2] found that measurement and analysis had a positive effect on organizational performance in the service industry. Effective data analysis is critical to the success of Measurement and Analysis: A study by [32] found that effective data analysis was critical to the success of measurement and analysis practices in the manufacturing industry. Similarly, a study by [33], found that effective data analysis was a key factor in the success of measurement and analysis practices in the service industry. Measurement and Analysis can lead to improved decision-making: A study by [12] found that measurement and analysis had a positive effect on decision-making in the manufacturing industry. Similarly, a study by [28] found that measurement and analysis had a positive effect on decision-making in the service industry. Measurement and Analysis can lead to improved quality: A study by [17] found that measurement and analysis had a positive effect on quality in the manufacturing industry. Similarly, a study by [32] found that measurement and analysis had a positive effect on quality in the service industry. Measurement and Analysis can lead to improved customer satisfaction: A study by [15] found that measurement and analysis had a positive effect on customer satisfaction in the manufacturing industry. Similarly, a study by [18] found that measurement and analysis had a positive effect on customer satisfaction in the service industry.

Overall, the empirical evidence suggests that Measurement and Analysis is a critical component of TQM and is positively related to organizational performance, decision-making, quality, and customer satisfaction. Effective data analysis is a key factor in the success of Measurement and Analysis practices, and organizations that prioritize Measurement and Analysis and implement TQM practices that enhance Measurement and Analysis are likely to experience significant benefits in terms of organizational performance, decision-making, quality, and customer satisfaction.

Organizational Performance

Organizational performance can be defined as the extent to which an organization achieves its goals and objectives. Measuring organizational performance is important for several reasons, including assessing the effectiveness of organizational strategies, identifying areas for improvement, and making informed decisions about resource allocation.

There are several approaches to measuring organizational performance, including:

Financial performance measures: Financial performance measures include metrics such as revenue, profit, return on investment, and market share. These measures provide insight into the financial health of an organization and are often used to evaluate the success of business strategies. Customer satisfaction measures: Customer satisfaction measures include metrics such as customer surveys, net promoter score (NPS), and customer retention rates. These measures provide insight into the quality of the products and services provided by the organization and the overall satisfaction of its customers. Employee satisfaction measures: Employee satisfaction measures include metrics such as employee surveys, turnover rates, and absenteeism rates. These measures provide

insight into the organizational culture, employee engagement, and overall job satisfaction of the workforce. Process measures: Process measures include metrics such as cycle time, defect rate, and productivity. These measures provide insight into the efficiency and effectiveness of the processes used by the organization to produce its products and services. Social responsibility measures: Social responsibility measures include metrics such as community involvement, sustainability practices, and ethical behavior. These measures provide insight into the organization's commitment to corporate social responsibility and its impact on the broader community and environment.

When measuring organizational performance, it is important to consider multiple measures to gain a comprehensive understanding of the organization's success. Furthermore, it is important to measure organizational performance over time to identify trends and patterns and to determine whether organizational performance is improving or declining. In the context of this study organizational performance as measured using a combination of a number of factors to provide a more comprehensive view of how TQM affect firm performance in the downstream oil and gas sector in Ghana. In the petroleum industry, TQM can be applied to a range of activities, including exploration, production, refining, transportation, and distribution. There is evidence to suggest that TQM can have a positive impact on firm performance in the petroleum industry. For example, a study by [1] found that TQM practices were positively associated with organizational performance in the oil and gas industry in the Middle East.

Similarly, another study by [12] found that TQM practices were positively related to firm performance in the Nigerian oil and gas industry. The study identified several TQM practices that were particularly important for improving performance, including customer focus, employee involvement, continuous improvement, and process management.

However, it is important to note that the impact of TQM on firm performance can depend on a range of factors, including the specific TQM practices implemented, the organizational culture, and the competitive environment. Additionally, the petroleum industry is subject to a range of external factors, such as fluctuations in oil prices and regulatory changes, which can also affect firm performance. Overall, while there is evidence to suggest that TQM can have a positive impact on firm performance in the petroleum industry, it is important to consider the specific context and factors that may influence the effectiveness of TQM practices.

TQM and Service Quality and Customer Satisfaction in the Petroleum Sector in Ghana

Total Quality Management (TQM) is a management approach that seeks to improve the quality of products and services by involving all employees in the organization in the continuous improvement of processes. In the downstream petroleum sector in Ghana, TQM can be applied to a range of activities, including fuel retailing, lubricant sales, and LPG distribution. Service quality is an important aspect of TQM and refers to the degree to which a service meets or exceeds customer expectations. In the downstream petroleum sector, service quality can be measured through factors such as reliability, responsiveness, assurance, empathy, and tangibles (such as the physical appearance of service stations).

Research on TQM and service quality in the downstream petroleum sector in Ghana is limited, but there is evidence to suggest that TQM practices can have a positive impact on service quality. For example, a study by [1] found that TQM practices were positively associated with service quality in the construction sector in Ghana.

The study identified several TQM practices that were particularly important for improving service quality, including leadership commitment, customer focus, employee

involvement, continuous improvement, and supplier management. These practices can help to ensure that customer needs and expectations are understood and met, and that processes are continually improved to enhance service quality. However, it is important to note that the impact of TQM on service quality can depend on a range of factors, including the specific TQM practices implemented, the organizational culture, and the competitive environment. Additionally, the downstream petroleum sector in Ghana is subject to a range of external factors, such as fluctuations in fuel prices and regulatory changes, which can also affect service quality.

Overall, while there is limited research on TQM and service quality in the downstream petroleum sector in Ghana, there is evidence to suggest that TQM practices can have a positive impact on service quality. It is important for organizations to implement TQM practices that are tailored to their specific needs and context, and to continually evaluate and improve their service quality.

Total Quality Management (TQM) is a management approach that focuses on continuous improvement of processes, products, and services to enhance customer satisfaction and create value for stakeholders. Customer satisfaction is a key component of TQM, and it is achieved by meeting or exceeding customer expectations through the delivery of high-quality products and services. TQM involves a comprehensive approach to quality management, which includes the integration of quality into all aspects of the organization, from leadership and strategy to operations and customer service. The goal is to create a culture of quality that emphasizes continuous improvement and customer satisfaction. Creating value for customers is also a key aspect of TQM. Value creation involves understanding and meeting the needs and wants of customers through the delivery of high-quality products and services that provide benefits that exceed their costs. TQM emphasizes the importance of understanding customer needs and expectations and using that understanding to continuously improve products and services to meet those needs.

In summary, TQM is a customer-focused approach to quality management that aims to enhance customer satisfaction and create value for stakeholders through continuous improvement of products and services. By implementing TQM principles, organizations can improve their competitive position, increase customer loyalty, and achieve long-term success.

Research Methods

The study took advantage of the strength of both quantitative and qualitative research approaches. Both at the company's and individual levels, questionnaires and interview guides were used in order to derive a rich source of data for the study. Also, the survey design was employed as it gives the opportunity to determine attributes of the population in which to derive the sample. Also is the fact that it poses an economic advantage and also the flexibility it presents for data collection. This design is adopted since it presents an avenue to reduce errors in the research study as it involves a systematic and well organised approach to data presentation aimed at arriving at accurate conclusions.

The unit of analysis for the study included individual customers who are using the company's products and also patronize the company's business premises during the study, staff of the companies at the Quality Control department, and managers in charge of quality control in the companies.

Random and purposive sampling methods were adopted in sampling the respondents. Simple random sampling approach was used to arrive at the customer sample size while the purposive sampling method was used to sample both management and staff of the companies. It is important to note that the sampling of the customers was done at all operating hours of the day. This was to prevent the sample from being

skewed to a particular section of the day. Additionally, the application of the simple random sampling method in the sampling of the customers ensured that each customer had the same chance of being part of the sample.

Table 1. Distribution of Sample

Respondents	**Number**
Management	10
Staff	60
Customers	290
Total	**360**

Source: Researcher Construct, 2023

On the other hand, quantitative data from customers and staffs of the companies were derived using questionnaire approach. As compared to other research tools, the questionnaire was the preferred choice as it presents a valuable opportunity to enable the collection of a wide range of information from a substantial number of respondents. In this instance where a large number of respondents ranging from customers, management and staff, the use of questionnaire to arrive at collection of useful information for the study was justifiable.

Both questionnaire and interview guide were structured into sections in the manner that each section could cater for one of the objectives. This is to ensure that the survey tool contained all needed information that would answer all the research questions and objectives. Separate questionnaires were designed for customers and staff. The questionnaires tackled the demographic characteristics of the respondents with key variables including age, gender, and educational background. Variables such as years of working experience and years of subscription were elicited for both questionnaires for staff and customers respectively. This information is key in determining respondents' relationship with research questions and objectives of the study.

The second section of both questionnaires focused on the extent to which TQM has been implemented in the Companies. Specifically, the questionnaire on the staff will explore the dimensions of TQM which have been successfully implemented in the company in enhancing the quality of service and product including top management commitment, customer focus, training and development, teamwork, continuous improvement, employees' involvement and quality of products and services. Also, the questionnaire will explore which of the basic principles of total quality management is very important to the company (Satisfying the customer, satisfying the supplier and continuous improvement in services and products) and organizational performance. On the other hand, the questionnaire for customers will explore the extent to which TQM has been implemented in the companies by using the five key dimensions of quality in total quality management including Tangibles, Reliability, Responsiveness, Assurance, and Empathy (including access, communication, understanding the customer) were used. These variables were measured on a five- point likert scale where 1 represented a response of "Strongly agree" and 5 a response of "Strongly Disagree". A five-point scale was used as against the traditional five-point scale due to the tendency for individuals to select responses in the centre of the scale if an odd number response scale was used.

With regards to responsiveness, questions focused on the time-of-service delivery, prompt service and staff willingness to assist customers. Questions like staff behaviour, instil confidence in customers, safety in dealing with their customers, courtesy of staff and whether the staff have the knowledge in dealing with customers or not constituted the assurance aspect. Questions

on empathy concerned individual attention, operating time of the Company, distance to the branch offices, staff interest in customers and whether staff understand specific needs of the customers or not.

The third section of both questionnaires focused on the extent to which TQM influence customer satisfaction and organizational performance.

The fourth section of the questionnaire for staff focused on the challenges faced by the companies in the practice of TQM. The key barriers to the successful implementation of total quality management as identified in the literature were explored in this section. Specifically, these barriers included cultural and employee barrier, infrastructure barrier, lack of planning for quality, lack of customer focus and leadership for quality, lack of motivation and skills, lack of knowledge and management on quality management of customers, lack of management commitment and leadership to quality management, lack of understanding of quality and total quality management and inadequate resources for total quality management.

Both questionnaires ended by soliciting suggestions from both staff and customers on the appropriate recommendations that can be put forward to improve staff total quality management practices in an effort to improve customer satisfaction in the Companies and firm performance.

Field data collected underwent a cleaning process before analysis at the data entry stage. Data was inspected and cleaned to correct all error ridden data. Version 27 of the Statistical Product and Service Solutions (SPSS) was used to analyse the data. Percentages and frequencies were used to present the resultant information. Therefore, both inferences and descriptive statistical analysis were used in responding to the research questions.

The inferential statistics used are the Pearson Correlation, the Chi-square test of independence and the Multiple Regression analysis. Whereas the impact of the dimensions of TQM on customer satisfaction was examined using the Multiple regression analysis to explore the questionnaires, that of the demographic patterns of the respondents was examined using the chi-square test of independence. In order to understand the regression analysis, the variables "product and service quality" and "general satisfaction level of the customers about product and service" were used as independent and dependent variables respectively. Inferential statistical analyses were performed at a 95 percent confidence interval.

The regression analysis was used at a five (5) percent significance level to test the hypothesis that the execution of TQM insignificantly impacted on downstream petroleum companies' customers' satisfaction level. Thus, the null hypothesis is rejected if the significance value of the test-statistics (p-value) arrived at is less than 0.05. In other words, if the tested alpha value is than 0.05 then the null hypothesis is ignored.

Hypothesis

Below are the constructed hypotheses to complement the research objectives:

H_0: The implementation of TQM practices insignificantly impacts on the service satisfaction of customers of downstream petroleum companies.

H_1: The implementation of TQM practices significantly impacts on the service satisfaction of customers of downstream petroleum companies.

Results and Discussion

The Demographic Descriptions of Respondents

The analysis and discussion of the demographic characteristics of the total 360 respondents who participated in the study are presented in this section. The respondents constituted 290 customers, 10 management members and 60 staff across various branches of oil marketing companies within the Greater Accra Region. Gender, age and educational backgrounds constitute the variables analysed in

examining the demographic characteristics of the respondents. Number of working experiences for staff was also examined.

Table 2. Represents results of the gender distribution of the respondents.

Table 2. Gender Distribution of Respondents

Gender	Customers		Staff	
	f	%	f	%
Male	166	57.2	29	48.3
Female	124	42.8	31	51.7
Total	290	100.0	60	100.0

Source: Field work, 2023

As seen from the table above, male respondents from the customer category (57.2%) dominated the female category (42.8%). On the other hand, female (51.7) slightly dominated the male (48.3%) staff category of the respondents. From the statistics for the gender distribution in the staff category across the various oil marketing companies, it is a clear indication that there is probable more staff at the customer service departments of the companies (with the quite marginal variation of 3.85%) as under normal circumstances, employers prefer women to fill vacancies at customer service departments owing to women' general appealing and welcoming nature. The choice of women over men can also be attributed to the fact that customer service career has been generally branded as women-oriented career. To this effect, there is high probability of employers recruiting more women than men under this category. Analysis of age distribution of respondents was also done. It was observed that majority of the customers constituting as high as 66.9% of the total respondents are under the youthful bracket of 20-39. This was followed by age bracket of 40-49 representing 24.3% of the total respondents. As low as 8.8% of the customers are under the age bracket 50-69. On the other hand, out of the total respondents for staff, 51.8% fall under the age brackets of 30-39. An age bracket 40-49 constitutes 29.6% whereas 18.5% of the total staff respondents fall under the brackets 50-59. It is observed that unlike the customer category that has representation within the retirement bracket that of the staff has none. Figure 1 below gives a bar chart representation of the age distribution for customers and staff of the total respondents.

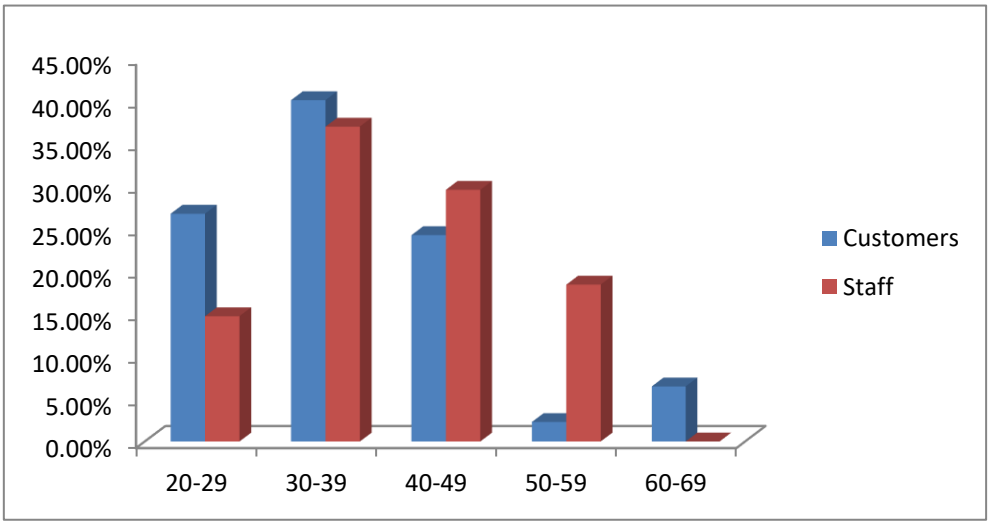

Figure 1. Age Distribution of the Respondents

Source: Fieldwork, 2023

It can be deduced that generally a large number of the respondents of both customers and staff are within the youthful bracket and therefore are young, energetic, and productive and therefore could contribute a greater part to the development of the company and largely to the economic wellbeing of the economy. The indication that a number of the customers are aged, it is prudent to ensure that total quality management is successfully implemented to also cater for the needs of the aged.

Analysing the educational background of the respondents, it was observed that quite a significant number of the staff had attained at least a university degree. These constitute as high as 91.7%. there was no Senior High School or below leaver as all the remaining 8.3% had attained an HND. Only 20.4% of the customers on the other hand had attained a university degree while 36.4% had an HND. A largest proportion of 43.2% of the total respondents had up to Senior High School Certificate. Even though a substantial number representing 56.8% had at least HND, the number constituting Senior High School and below is quite significant. Figure 2 show the graphical representation of the educational backgrounds of the customers and staff respondents.

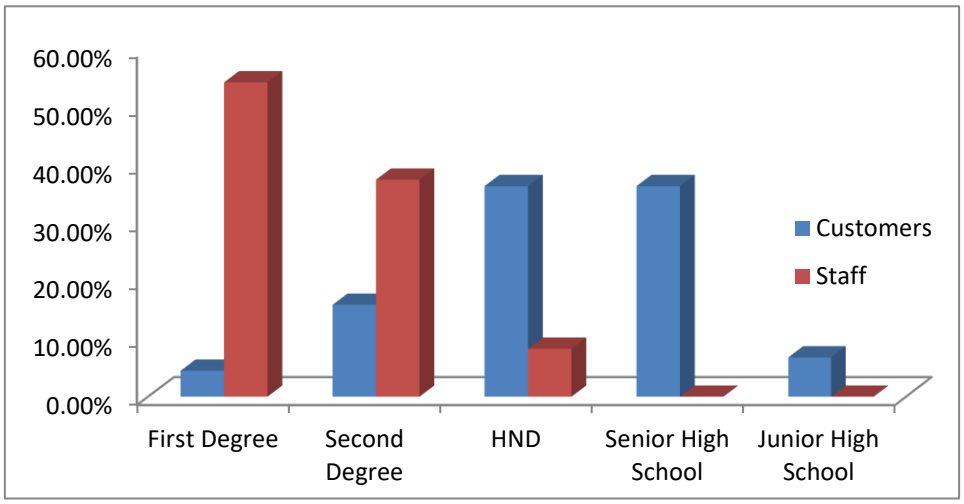

Figure 2. Educational Backgrounds of the Respondents

Source: Fieldwork, 2023

It can be deduced that even though not surprising, there was way high number of respondents of staff with higher educational background as compared to the customers. This can be attributed to the professional nature of the telecommunication work and in particular the customer service career for which candidates with higher educational background such as first degree is prioritised. Successfully implementing TQM is much dependent on staff professionalism and working experience. Therefore, number of years for which staffs have worked with the company was accessed and analysed. Table 3 below gives a summary overview.

Table 3. Period of Working with the Company

Period (Years)	Frequency	Percent
0-2	9	15.0
3-5	36	60.0
6-8	12	20.0
9-11	3	5.0
Total	60	100.0

Source: Fieldwork, 2023

As indicated on the table, as high as 60% of the staff have worked with the various companies for within 3-5 years whereas as low as about 5% have 9-11 years working experience with the company. A critical review of the data showed that as high as 75% of the staff have had at most 5 years working experience with their companies. This shows that majority of the staff have had an adequate working experience and are in a good position to better evaluate the TQM practices and its impact on the company's customer satisfaction.

TQM and Extent of Practice in the Various Companies

Under this section, views of staff and management were obtained towards assessing the magnitude of TQM practices within the company. Employee awareness and relevance of the concept of TQM was assessed. Also, prevailing avenues for employee training as well as the role and responsibility to be played by staff towards a successful execution of the concept were also explored. Overall, the organisational core values served as bases for exploring the degree to which TQM has been executed while giving key priority to customer perception.

The following quality initiatives were derived during the interview section in collaboration with management who participated in the research for the implementation of TQM in the company:

1. Initiation of change management programme;
2. Software upgrades;
3. Initiation of online customer services;
4. Initiation of point of sale (POS) and,
5. Performance management practice.

The outlined quality initiatives were noted to have been introduced by management of OMCs for the implementation of TQM.

Table 4. Dimension of TQM which has been Successfully Implemented

Dimension	**Weights**						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Top management commitment	0	6	10	25	7	10	2
Quality of products and services	0	2	10	30	8	10	5
Training and development	30	8	4	4	2	9	2
Teamwork	14	15	20	0	0	9	9
Employees' involvement	15	25	12	4	4	0	0
Continuous improvement	0	0	0	10	10	20	20
Customer focus	0	0	0	4	9	21	26

Source: Fieldwork, 2023

The Relative Importance Index (RII) tool was used to analyse the dimensions of TQM using the formula below:

Relative importance index (RII) = $\frac{\sum w}{AN}$, where 'w' is the weighting given to the dimensions by the respondents ranging from1-7, A represents the highest weight (i.e 7) and N represents total number of staff (i.e 60).

As indicated from the table 4, higher RII value means the dimension had been successfully implemented in the company.

Table 5. Dimension of TQM Which has Been Successfully Implemented

Dimension	**RII**	**Rank**
Top management commitment	0.59	4
Quality of products and services	0.69	3
Training and development	0.36	6

Teamwork	0.53	5
Employees' involvement	0.33	7
Continuous improvement	0.83	2
Customer focus	0.88	1

Source: Fieldwork, 2023

From the table above, 'customer focus' emerged the most significant dimension of TQM as it earned the highest RII value of 0.88. This is followed by 'continuous improvement' with RII value of 0.83. 'Customer focus' being the most successfully implemented and important dimension of TQM supports [2] submission that the philosophy and assumption behind the implementation of TQM must be one geared towards the customer's interest. As also supported by [4] that in the settings of total quality implementation, quality is determined and bordered on customers' satisfaction and that the customer must be seen as the embodiment of the company's life. This implies that to ensure value for money and benefit of the company, the company must focus on customer needs as suggested by [6]. The second ranked most important principle and successfully implemented principle of TQM is an indication that for a company to be competitively advantaged it ought to ensure a sustainable improvement in its product and service delivery to customers as indicated by [7]. These juxtapose that the companies in effect must largely rely on its customers to arrive at a true meaning and understanding of quality of product and service as per customers perspective to guide its TQM implementation decisions.

On the other hand, employee's involvement and training and development were ranked seventh and sixth respectively in order of less significant principles that have been given less priority in their implementation. This does not auger well for oil marketing companies as low level of employees' participation in the TQM implementation has diverse negative implications on the company in an attempt to achieve quality. This is supported by [8] advocating that in the context of TQM the 'total' connotes involving all stakeholders, the backbone to achieving quality within a company.

TQM Practices and its Impact on Customer Satisfaction and Retention

This section explored the influence of TQM on customer satisfaction by examining the satisfaction level of the customers in relation to the quality of service rendered by staff of the companies. Assessment of whether or not staffs' capacity in rendering quality service and product had any positive effect on customers' satisfaction level. The table 6 below gives a summary overview of the analysis on customers status based on the set multiple response variable.

Table 6. Description of Current Status in Relation to Loyalty to OMC

Response	**Frequency**	**Percentage**
I do not have any intention of switching to another operator	168	57.9
I am constantly looking for opportunities to leave this OMC	68	23.4
I See little advantage in switching from my OMC	168	57.9

Source: Fieldwork, 2023

As observed from the table above, a significant 57.9% of the total customers contacted showed no intention of switching service provider(s) as they see no significant added benefits in switching. This is an indication that TQM has been generally successfully implemented and impact manifesting.

Table 7 shows the results on the general level of satisfaction of customers in relation to the quality of service rendered by staff to customers. The table below gives a general results and impression of customers satisfactory level in relation to quality of service and product delivered by staff of oil marketing companies.

Table 7. Satisfaction Level in Relation to the Quality of Service Rendered by Staff

Response	Frequency	Percentage
Highly satisfied	120	41.4
Somehow satisfied	145	50.0
Not satisfied	25	8.6
Total	290	100.0

Source: Fieldwork, 2023

As observed from the table above, a significant 41.4% of respondent customers argued that they were highly satisfied with services and products rendered while 50.0% argued they were moderately satisfied with product and services offered by their OMC. Detailed analysis revealed that there is variation in customer satisfaction on product and services rendered by staff according to customers gender (χ^2 = 6.220, df= 2, p = 0.0445). More males (65.4%) were somehow satisfied with the quality of product and services offered while 55.0% of female respondents argued that they were highly satisfied. This implies that female customers are more likely to be content with quality of service and product offered by the company through the implementation of TQM as compared to the male counterparts. Therefore, service quality should be offered equally regardless of gender.

However, it was noticed that customers were more satisfied with in-service delivery than that of products of the company. For example, one of the customers who responded to the study mentioned:

Its critical review revealed that customers' interest and satisfaction depended more on the service provision as compared to product delivery. For instance, one respondent during the data collection process argued by commenting as follows:

I think that the company has been able to improve upon its services delivery through the implementation of TQM most especially in the professional orientation of the customers. However, service quality on tangibles such as company's equipment and tools including the services were noted to be inefficient in performance.

It was also observed that management shared same sentiment as one Operations Manager commented on as follows:

The problem in my view is one of the limitations of modern-day technology which customers need to understand. However, customer satisfaction has increased in other aspects of our operations in terms of quality of product and even pricing.

The views of staff in relation to how TQM influences customers' satisfaction in the companies were also explored. In relation to improved satisfied customers, about 66.7 percent of the customers who responded to the study indicated that the TQM of the company has improved satisfied customers. This result was further supported by the management members who responded to the study. On the issue of the Companies having to focus its attention on issues of improving, measuring, and controlling its service quality and efficiency through the implementation of total quality management, the head of customer service stated during the interviews that 'the customer must always leave here a happy person'.

Staff view concerning how TQM implementation affects customer satisfaction levels was also examined. It is observed that 66.7% of the respondents argued company responded as follows:

TQM will improve standards and guarantee service quality which will eventually lead to certification of policies and procedures.

The implementation of TQM will guarantee improvement in delivery in quality-of-service standards, thereby resulting to a collective endorsement of the company policies and procedures.

Hypothesis Experimenting

This study adopted the ordinal regression analysis to examine the hypothesis as part of measures to determine how TQM has helped ensure positive impact on customer satisfaction.

$H_{0:}$ The implementation of TQM practices insignificantly impacts on the service satisfaction of customers of OMCs.

H_1: The implementation of TQM practices significantly impacts on the service satisfaction of customers of OMCs.

In undertaking the regression analysis, the variable "How would you describe your level of satisfaction in relation to the quality of service rendered by your oil marketing company" was used and represented the dependent variable to determine customer satisfaction. On the other hand, "*continuously improving product*; *Participation in product quality*; *employee empowerment*; and *commitment to TQM* were among the deduced principles of TQM used as the independent variables in determining. As the dependent variable was deduced on an ordinal scale, the ordinal regression analysis was performed on the independent variables.

Table 8. Model Summary on Customer Satisfaction

Model	2 Log Likelihood	Chi-square	Sig
Intercept only	60.304	-	-
Final	26.664	33.639	0.040

Source: Fieldwork, 2023

Predictors: Continuously improving product, participation in product quality, employee empowerment, commitment to TQM and p is significant at 0.05.

In examining the significance of the ordered logistic regression analysis, the significance of the predictor variables model derived through an iterative process that tend to increase the log likelihood of the outcome as seen the outcome variable was performed. It is observed that the regression model is significant as shown from the table above (where $\chi^2 = 33.639$, p = 0. 040), also as at least one of the regression coefficients in the model is not equal zero. It can also be observed from the table that as the predictor variables are included and the log likelihood of the outcomes are maximised as seen in the data, the "final" model has improved upon the "Intercept Only" model. This can be observed from the -2(Log likelihood) values in connection with the models. The Pseudo R-Square analysis presented a Nagelkerke value of 0.380, implying that 38% of the variation in the level of customer satisfaction in relation to the services offered to customers by staff of OMCs has been explained by the TQM principles and dimensions.

In the end, as the significance value of the test-statistics (p=0.040) derived is below 0.05, it therefore means the null hypothesis:

$H_{0:}$ The implementation of TQM practices insignificantly impact on the service satisfaction of customers of OMCs is rejected in favour of the alternative hypothesis:

$H_{1:}$ The implementation of TQM practices insignificantly impacts on the service satisfaction of customers of OMCs.

In effect, this study concluded that TQM implementation and practices by OMCs impacted on customer satisfaction. This assertion is in line with Paxton (1993) conclusion that TQM tend to form an underpinning for customer satisfaction and a path for assessment of customers' needs through continuous quality improvement and benchmarking. Taking note of a major impact of TQM implementation on customers' satisfaction

will require that the opportunities associated with TQM are well tapped by management of OMCs to create a well-coordinated strategy of innovation and teamwork to satisfy the ever-increasing customer expectations and satisfaction continually and adequately.

In connection with staff extensively complying to customers' expectations (TQM on customer orientation), it was observed that this had a significant positive effect on customer satisfaction (b=0.453, p=0.024). This on the other hand means that as staff develop more commitment towards meeting customers' expectations in the same vein customers satisfaction level is likely to increase in magnitude. The TQM principles of continually improving and learning through staff demonstrating customer serving skills was also found to have major impact (b=0.505, p=0.005). Therefore, a major positive impact relationship was observed between continuous improvement and learning and customer satisfaction. This also means that if staff of OMCs put up a philosophy and strategic system for improving the level of quality of product and service offered to customers, customers' satisfaction levels is also likely to accelerate. This also means that for management of OMCs to ensure that TQM implementation adequately have positive effect on customers satisfaction, they ought to give utmost priority to customers ideas and concerns and convert these ideas into attainable information so as to evaluate the effects of improvement measures and to further strengthen the customer focus and commitment in the company. As pointed out by [4] in order to arrive at maximum customer satisfaction, there is the need to adequately improve quality process until customer demands are met.

Leadership commitment was also found to have a significant effect on the satisfaction of customers (b=0.455, p=0.056). This result is consistent with [7] empirical finding that there is a significant effect of leadership on the implementation of total quality management. Another factor that was observed from the study is that leadership commitment played a major role on customer satisfaction (b=0.455, p=0.056). This is in tandem with empirical conclusion by [8] implying that there is a major impact of leadership role on the successful implementation of TQM in an organisation. This means that the more leadership are committed in overseeing the implementation of TQM principles and dimensions there is the more likelihood that staff will be able to convert efforts and principles towards enhancing the general quality of product and service for the general benefit of customers. In effect as indicated by [32], commitment of management leadership is a very crucial factor in implementing TQM since it helps improve performance by influencing other TQM practices and principles.

Conclusion

The results of the study showed that oil marketing companies that have implemented the principles of TQM especially with high leadership commitment and training will experience higher customer satisfaction which could translate into improved financial performance. This is very critical especially given the deregulation of the sector and the fact that quality service could help make a customer decide to patronize a particular OMC or not. In summary, customer service by OMCs in Ghana is characterized by a focus on service quality, well-trained staff, clean and safe facilities, product availability, convenience, and transparency. These companies value customer feedback, offer loyalty programs, and uphold social and environmental responsibilities. By prioritizing customer satisfaction and continuously improving their services, OMCs aim to build strong relationships with their customers and maintain a competitive edge in the industry.

Conflict of Interest

Author declares that there is no conflict of interest.

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