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Open Label, Single Centre Study of Babao Relief Capsule as an Adjuvant to HAART in Antiretroviral Naive HIV Patients

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Abstract

HIV continues to be a major global public health issue, having claimed 36.3 million [27.2–47.8 million] lives so far (WHO, 2021). Sub-Sahara Africa remains the far worst affected region, with 20.6 million [16.8 million– 24.4 million] people living with HIV at the end of 2010, compared to 24.4 (22.5-27.3 million) in 2020. Complementary and alternative therapy (CAM) has been used to treat HIV patients by clinicians in conventional health services in combination with highly active antiretroviral therapy (HAART). To determine efficacy of Babao relief capsule when used as an adjuvant to standard HAART in antiretroviral naïve HIV patients. The product is a biological Chinese medicinal preparation, made of herbs. Ingredients include ginseng, beer antler, musk, bezoar, fleeceflower, Chinese angelica, lyceum, pericarpium citri reticulatae, safflower and ophiopogn japonicus. Open Label Phase 1 bridging Clinical trial to study the efficacy of Babao relief capsule when used in combination standard HAART in antiretroviral naïve HIV patients. A total of one hundred and ninety-six (196) adult patients attending the HIV clinic were randomly selected. The interventional group was on Babao relief capsule and HAART while the control group was on HAART only. The study shows general efficacy of the standard HAART drugs. However, the interventional arm showed a significant increase in the CD4 cell count, showing that BRC had booster effects in the efficacy of HAART.

Keywords: *HIV, Complementary and alternative therapy, Babao relief capsule, standard highly active antiretroviral therapy.*

Introduction

HIV continues to be a major global public health issue, having claimed 36.3 million [27.2–47.8 million] lives so far [1]. According to the WHO report of 2021 there were an estimated 37.7 million [30.2–45.1 million] people living with HIV at the end of 2020, over two thirds of whom (25.4 million) are in the African Region. Sub-Sahara Africa remains the far worst affected region, with 20.6 million [16.8 million–24.4 million] people living with HIV at the end of 2010, compared to 24.4 (22.5-27.3 million) in 2020.

Sub-Sahara constitutes 10% of the world population yet just under two thirds (6%) of all the people living with HIV are in this region, as are more than three quarters (76%) of allwomen living with HIV. In Zambia, 1 in every 3 adults carries HIV or has AIDS, while Eswatini**,** Lesotho, and Botswana have the highest HIV prevalence. In 2020, Eswatini had the highest prevalence of HIV with a rate of almost 27 percent. Zambia has declared HIV/AIDS a national emergency in a bid to start manufacturing generic AIDS drugs underWorld Trade Organization (WTO) [2]. Patent western antiretroviral drugs cost between $300and $1000 for a month's dosage in this southern African country of 18 million people, the majority of which live below the World Bank poverty threshold of $2.15 per day [3]. While theface of the epidemic has changed in Western Europe and America with the coming of Highly Active Antiretroviral Therapy (HAART), the situation

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in Africa has been different, as most of the affected have limited access to antiretroviral drugs (ARVS) and reasonable nutrition; this picture has been changing as more people in developing countries are accessing HAART.

Complementary and alternative therapy (CAM) refers to the use of treatment not provided by clinicians in conventional health services, though both serve the same goal of pursuinggood health [4]. Traditional Chinese Medicine (TCM) constitutesone form of CAM which is widely used in Chinese communities around the world. Data from Asia in a Thailand study in 2003, 95% of the HIV patients reported the use of some forms of CAM, and 78% having visited a CAM provider [5]. A significant proportion of these studies were conducted before the introduction of highly active antiretroviral therapy (HAART), the latter becoming a gold standard in clinical HIV management [6].

With the widespread use of HAART in not just developed but developing countries, there is the new concern about interaction between CAM and HAART, which may potentially affect the outcome of treatment [7].

On average, published research indicates that 60% of HIV+ individuals use CAM to treatHIV-related health concerns [8]. In the context of conventional HIV care, where survival depends on proper use of and adherence to highly active antiretroviral treatment [9], the potential for CAM use to interfere with the success of HAART is a pressing concern as alluded to above. With little evidence supporting the safety and efficacy of CAM for HIV [10], research that identifies factors associated with CAMuse and the implications of CAM use for HIV care is of considerable importance.

The objective of the clinical trial is to determine efficacy of Babao relief capsule when used as an adjuvant to standard highly active antiretroviral therapy (HAART) in antiretroviral naïve HIV patients. If found efficacious it will go a long way in lowering the cost of treating HIV patients, joining the other Complimentary Alternative Medicines on the market. The disease has now become a controllable disease with people infected with HIV living almost normal life spans.

Literature Review

From the literature search three analytical studies have been conducted [11] with only one controlled trial which was identifiedconducted using Chinese traditional medicines for HIV-related peripheral neuropathy. Shlay et al recruited 250 patients for a double-blind, placebo-controlled, multicenter study of acupuncture and amitriptyline [12]. The design allowed comparisons to be made between any of the four groups: real acupuncture, sham acupuncture, amitriptyline, placebo medication. Patients in the acupuncture groups received 20 treatments, either: a. SP9, 7 and 6 as standard plus K13, 2 or Ba Feng points as indicated by symptoms or b. Superficial needles at three non-acupuncture points in the calves. Pain was assessed at 6 and 14 weeks (the end of the trial) using an appropriate rating scale (the Gracely scale). There were no significant changes in pain score to indicate that either acupuncture or amitriptyline were more effective than placebo.

This trial was large and well designed, and hence not subject to many of the usual criticisms of clinical trials of complementary therapies. However, the points chosen for the real acupuncture treatment have been criticized as being inappropriateand hence more suitable as a placebo [13]. The points had been chosen by consensus amongeight acupuncturists. This kind of debate will inevitably become more prominent if traditional Chinese protocols are used more frequently in research trials.

A review by Ozsoy and Ernst aimed to evaluate all randomized controlled trails of complementary therapies for HIV [14]. As well as the one acupuncture study, they also locatedtrials using herbs, supplements, stress management techniques and massage. After emphasizing the paucity of good evidence, they suggest that these therapies may best be employed in a “caring” rather than “curing” mode, looking to increase

quality of life.

Ten papers describe outcome trials, which, having no control groups, may therefore be influenced by the placebo response, the self-limiting nature of some conditions and by intervention from other forms of medical treatment.

There are three outcome audits analyzing treatment given in a Western setting [15]. Smith (1988) describes his experience at the Lincoln Hospital, New York, and two other metropolitan centers in the USA, in treating over 350 patients with AIDS over a 5-year period using acupuncture and Chinese herbal medicine. He offers an evaluation of the response of these patients to this treatment through looking at changes to symptoms and survival times as measures of benefit.

The exact methodology used is not described (what form of questionnaire was used etc.), nor are there details of the statistical analysis, but the conclusion to the study was that:

1. There was substantial reduction in symptoms such as fatigue, night sweats and diarrhea.
2. 30 – 40% of a small sample of 14 AIDS patients seen between 1982 – 83 had a five-year survival rate after receiving acupuncture frequently over a 2 – 6 months period of time.
3. Herbal interventions have proved results and have significantly reduced thedropout rate in the programs.
4. Two cases of early-stage Kaposi Sarcoma showed apparent remission.
5. There was a general report of fewer symptoms of infection and reduction in side effects from Western drugs.

This paper is not really a study but more a series of observations and a collection of case histories. It does not describe the methodology used, has no form of control, and reportson a very small sample of patients who regularly attended treatment. Whilst it is of somehistorical interest its clinical relevance is diminished by the fact that it precedes both viralload testing and other blood tests that could objectively correlate symptomatic changes, and predates combination therapy, which would now almost certainly be prescribed to most of the cases described.

A study [10] describe the underlying theory and practical structure of the HIV treatment program at the American college of TCM in San Francisco. 67 patient outcomes were evaluated over a three-month period using a symptom checklist and a quality-of-life survey administered monthly, with “significant improvements” noted for fatigue, loss of appetite, lymphadenopathy, and neuropathy. In general, not only did the total number of symptoms diminish but also the severity. The shortcomings are like those for Smith’s work, with no control, a small sample group reporting on a wide range of 28 possible symptoms and no objective measurement to correlate to this reported improvement.

Flower uses the Measure Your Own Medical Outcome Profile (MYMOP) questionnaire as part of an outcomes audit of 18 patients seen over a six-month period at London Lighthouse. 15 out of 18 patients reported relief in their presenting symptoms and improvement in well-being. The shortcomings are the same as those mentioned above.

A Study [14] refer to the experience of a team ofsenior Chinese doctors invited to research the effect of Chinese herbal medicine on patients with AIDS in Tanzania [15]. Differentiation was made according to traditional Chinesecategories as well as a review of symptomatic changes and basic blood test results [14]. The conclusion of Xue and Su is that Chinese herbal medicine did bring some symptomatic relief for AIDS patients.

A study summarizes the pharmacological rationale and the clinical experiences of the Chinese team in Tanzania after having treated a total of 158 individuals over a three-yearperiod. The Karnofsky score – a measure of the degree of disability caused by an illness.

– showed improvement in 82 patients, and symptomatic improvements were noted in

lymphadenectasis, diarrhoea, anorexia, fever, weight loss, skin rashes and coughs. The methodology used to assess these changes is not given in the paper. The study also measured changes in T4 cells over time and T4/T8 ratios (3) and noted that 31% of patients showed at least temporary improvements in the former but the latter showed less response. Once again, the details of these measurements have been omitted from the article and the amount or the duration of the T4 cell is not clear.

A study report on eight cases of individuals converting from HIV + to HIV – after taking Chinese herbal medicine, which at the time of writing had never been reported in the medical literature and, if substantiated by future research under well-controlled conditions, is a potentially radical breakthrough. The subsequent absence of suchresearch suggests these results have proved difficult to replicate and may have been dueto an incorrect initial diagnosis of HIV status.

A study used traditional Chinese medicine for treating AIDS-related respiratory tract infection in a group of 58 patients, finding a clinical cure in 31% and therapeutic effectiveness in a further 12%. A contemporary group of 22 patients treated by combined Chinese and Western medicine had a less positive response but had started with more severe symptoms [15, 16].

The Products

Babao Relief Capsule

The product is a biological Chinese medicinal preparation, made of herbs. Ingredients include ginseng, beer antler, musk, bezoar, fleeceflower, Chinese angelica, lyceum, pericarpium citri reticulatae, safflower and ophiopogn japonicus.

Only one phase 1 clinical trial was conducted in Malaysia, 31 patients took part in the clinical trial. Since these patients were not on HAART, no study has been done to checkinteractions and side effects when Babao Relief capsule and HAART are used in combination. The objective of this clinical trial therefore is to assess the efficacy of BabaoRelief capsule when used as an adjuvant to HAART in antiretroviral naive HIV patients.

Each capsule of Babao is 0.5g and the dosage was 3g per day, one third of the current dosage. The viral load was substantially lowered by 60%. The CD4 count rose. Taking Babao Relief Capsule for 1-2 months showed a reduction in opportunistic infections and HIV/AIDS complications. Within 2-3 months, CD4 and CD4/CD8 rose considerably. The HIV viral load was reduced to undetectable level in 3 months. Bloating was the only reportedside effect from the clinical trial conducted in Malaysia.

Function: The product has anti-pyretic, analgesic; immune enhancer, anti-viral, anti-tumor, bactericidal and anti-inflammatory properties.

Application: Suitable for people infected with HIV and AIDS, anorexia, short of breath, emaciation, rash, diarrhea, night sweats, sore in the tongue and dry pharynx.

Dosage: The product is to be taken half an hour before meals or an hour after meals with lukewarm water.

Adults: 3g three times daily.

Children: 13-16 years, 2g three times daily. 7-12 years, 1.5g three times daily. 4-6 years, 1g three times daily. The course is for three months.

Tenofovir

VIREAD is the brand name for tenofovir disoproxil fumarate (a prodrug of tenofovir) which is a fumaric acid salt of bis-isopropoxycarbonyloxymethyl ester derivative of tenofovir. *In vivo* tenofovir disoproxil fumarate is converted to tenofovir, an acyclic nucleoside phosphonate (nucleotide) analog of adenosine 5'-monophosphate. Tenofovir exhibits activity against HIV-1 reverse transcriptase.

The chemical name of tenofovir disoproxil fumarate is 9-[(*R*)-2 [bis [(isopropoxycarbonyl)oxy] methoxy phosphinyl methoxy propyl] adenine fumarate (1:1). It has a molecular formula of $C_{19}H_{30}N_5O_{10}P$ $C_4H_4O_4$ and a molecular weight of 635.52. VIREAD (tenofovir disoproxil fumarate) tablets

are for oral administration. Eachtablet contains 300 mg of tenofovir disoproxil fumarate, which is equivalent to 245 mg oftenofovir disoproxil, and the following inactive ingredients: croscarmellose sodium, lactose monohydrate, magnesium stearate, microcrystalline cellulose, and pregelatinized starch. The tablet is taken once daily in combination with other antiretroviral drugs. Lactic acidosis and severe hepatomegaly with steatosis, including fatal cases, have been reported with the use of nucleoside analogs, including VIREAD (tenofovir disoproxilfumarate), in combination with other antiretrovirals. Many of these cases have been in women. Obesity and prolonged nucleoside exposure may be risk factors. Caution should be exercised when administering nucleoside analogs to any patient with known riskfactors for liver disease; however, cases have also been reported in patients with no known risk factors. Discontinuation of anti-HBV therapy, including VIREAD (tenofovir disoproxil fumarate), may be associated with severe acute exacerbations of hepatitis.Patients infected with HBV who discontinue VIREAD (tenofovir disoproxil fumarate)should be closely monitored with both clinical and laboratory follow-up for at least several months after stopping treatment. If appropriate, resumption of anti-hepatitis B therapymay be warranted. Tenofovir is principally eliminated by the kidney. Renal impairment,including cases of acute renal failure and Fanconi syndrome (renal tubular injury with severe hypophosphatemia), has been reported with the use of VIREAD. It isrecommended that creatinine clearance be calculated in all patients prior to initiating therapy and as clinically appropriate during therapy with VIREAD (tenofovir disoproxilfumarate)

Emtricitabine

EMTRIVA is the brand name of emtricitabine, a synthetic nucleoside analog with activity against HIV type 1 (HIV-1) reverse transcriptase. The chemical name of emtricitabine is 5-fluoro-1-(2*R*,5*S*)-[2-(hydroxymethyl)-1,3-oxathiolan-5-yl] cytosine. Emtricitabine is the (-) enantiomer of a thio analog of cytidine, which differs from other cytidine analogs in that it has a fluorine in the 5-position. It has a molecular formula of $C_8H_{10}FN_3O_3S$ and a molecular weight of 247.24. EMTRIVA (emtricitabine) capsules are for oral administration. Each capsule contains 200 mg of emtricitabine and the inactive ingredients, crospovidone, magnesium stearate, microcrystalline cellulose, and povidone.

EMTRIVA (emtricitabine) is indicated in combination with other antiretroviral agents for the treatment of HIV-1 infection.

The most common adverse reactions include headache, diarrhoea and nausea, fatigue, dizziness, depression, insomnia, abnormal dreams, rash, abdominal pain, asthenia, increased cough, and rhinitis.

Efavirenz

SUSTIVA® (efavirenz) is an HIV-1 specific, non-nucleoside, reverse transcriptase inhibitor (NNRTI). Efavirenz is chemically described as (S)-6-chloro-4- (cyclopropylethynyl)-1,4-dihydro-4-(trifluoromethyl)-2H-3,1 benzoxazin-2-one. Its empirical formula is $C_{14}H_9ClF_3NO_2$. Efavirenz is a white to slightly pink crystalline powder with a molecular mass of 315.68. It is available as film-coated tablets for oral administration containing 600 mg of efavirenz and the following inactive ingredients: croscarmellose sodium, hydroxypropyl cellulose, lactose monohydrate, magnesium stearate, microcrystalline cellulose, and sodium lauryl sulphate. in combination with other antiretroviral agents is indicated for the treatment of human immunodeficiency virus type 1 (HIV-1) infection. The most common side effects are rash, dizziness, nausea, headache, fatigue, insomnia, and vomiting.

Nevirapine

VIRAMUNE is the brand name for nevirapine, a non-nucleoside reverse

transcriptase inhibitor (NNRTI) with activity against Human Immunodeficiency Virus Type 1 (HIV-1). Nevirapine is structurally a member of the dipyridodiazepinone chemical class of compounds. The chemical name of nevirapine is 11-cyclopropyl-5, 11-dihydro-4-methyl- 6H-dipyrido [3,2-b:2',3'-e] [l,4] diazepin-6-one. Nevirapine is a white to off-white crystalline powder with the molecular weight of 266.30 and the molecular formula C15H14N4O. IRAMUNE (nevirapine) Tablets are for oral administration. Each tablet contains 200 mg of nevirapine and the inactive ingredients microcrystalline cellulose, lactose monohydrate, povidone, sodium starch glycolate, colloidal silicon dioxide and magnesiumstearate.

VIRAMUNE (nevirapine) is indicated for use in combination with other antiretroviral agents for the treatment of HIV-1 infection. The recommended dose for VIRAMUNE (nevirapine) is one 200 mg tablet daily for the first 14 days, followed by one 200 mg tablet twice daily, in combination with other antiretroviral agents. The lead-in period hasbeen observed to decrease the incidence of rash. The most serious adverse reactions associated with VIRAMUNE (nevirapine) are hepatitis, hepatic failure, Stevens-Johnson syndrome, toxic epidermal necrolysis, and hypersensitivity reactions. Hepatitis/hepatic failure may be isolated or associated with signs of hypersensitivity which may include severe rash or rash accompanied by fever, general malaise, fatigue, muscle or joint aches, blisters, oral lesions, conjunctivitis, facial edema, eosinophilia, granulocytopenia, lymphadenopathy, or renal dysfunction.

Dolutegravir

The Dolutegravir Sodium is the sodium salt form of dolutegravir, an orally bioavailable integrase strand-transfer inhibitor (INSTI), with activity against human immunodeficiencyvirus type 1 (HIV-1) infection. Dolutegravir is chemically described as (3S,7R)-N-[(2,4-difluorophenyl) methyl]-11-hydroxy-7-methyl-9,12-dioxo-4-oxa-1,8- diazatricyclo [{8.4.0.03,8}] tetradeca-10,13-diene-13-carboxamide [17, 18]. Upon oral administration, dolutegravir binds to the active site of integrase, an HIV enzyme that catalyses the transfer of viral genetic material into human chromosomes. This prevents integrase from binding to retroviral deoxyribonucleic acid (DNA), and blocks the strand transfer step, which is essential for the HIV replication cycle [19]. This prevents HIV-1 replication.

The adult dose of dolutegravir is one 50mg tablet once a day. If a patient is taking medications that may lower the serum concentration, it may be prescribed in dose of one 50mg tablet twice a day [20]. [20] Common side effects include trouble insomnia, fatigue, diarrhea, hyperglycemia, and headache. Severe side effects may include allergicreactions and liver problems. There are tentative concerns that use during pregnancy canresult in harm to the baby. It is unclear if use during breastfeeding is safe. Dolutegravir is an HIV integrase strand transfer inhibitor which blocks the functioning of HIV integrase which is needed for viral replication. It is on the World Health Organization's List of Essential Medicines. As of 2019, the World Health Organization (WHO) recommends DTG as the first- and second-line treatment for all persons with HIV [21].

Justification

There is increased use of CAM by the people living with HIV and AIDS hence there is need to assess the efficacy and safety of use of these remedies. In in the BRC study in Malaysia viral load was substantially lowered by 60%. The CD4 count rose. Taking BabaoRelief Capsule for 1-2 months showed a reduction in opportunistic infections and HIV/AIDS complications. Within 2-3 months, CD4 and CD4/CD8 rose considerably. The HIV viral load was reduced to undetectable level in 3 months.

Bloating was the only reported side effect from the clinical trial. No studies have been conducted to determine interaction effects of the

Babao Relief Capsule withantiretroviral therapy. The product is currently available on the Zambian market as a Chinese herbal remedy and is being used by HIV infected patients.

Research Question (RQ). Does Babao relief capsule increase the efficacy of standard antiretroviral therapy when used as an adjuvant in antiretroviral naive HIV patients?

Hypotheses

Null Hypothesis

1. There is difference in efficacy when Babao relief capsule is used with standard antiretroviral therapy and an adjuvant in antiretroviral naive HIV patients.

Alternative Hypothesis

1. Babao relief capsule increases the efficacy of standard antiretroviral therapy whenused as an adjuvant in antiretroviral naive HIV patients.

Objectives

General Objective

To determine efficacy of Babao relief capsule when used as an adjuvant to standard highly active antiretroviral therapy (HAART) in antiretroviral naïve HIV patients.

Specific Objective

1. To determine the clinical improvement of antiretroviral naïve HIV patients on Babao relief capsule over a period of three months used in combination with HAART.
2. To determine the effects of Babao relief capsule on the hematological, biochemical, and immunological indices in antiretroviral naïve HIV patients at three months in combination with HAART.
3. To determine the safety and tolerance of Babao relief capsule in antiretroviral naïve HIV patients used in combination with HAART.

Methods and Materials

Study Design

An open Label Phase 1 bridging Clinical trial to study the efficacy of Babao relief capsulewhen used in combination standard highly active antiretroviral therapy (HAART) in antiretroviral naïve HIV patients. The HAART combination was the preferred first line therapy of a backbone of Tenofovir, Emtricitabine with Dolutegravir or Efavirenz. A total of one hundred and ninety-six (196) adult patients attending the HIV clinic were randomlyselected. There were one hundred and four participants in the interventional and 92 in thecontrol groups.

The interventional group was on Babao relief capsule and HAART while the control groupwas on HAART only.

Male and female volunteers between the ages of 18 and 55 years old with proven HIV 1 infection were recruited. During the study if it may become necessary to take other medications, the participants would inform study personnel. The participants did not take chemotherapeutic drugs, interferons or steroids while participating in the study. Pregnant women and HAART experienced patients were excluded from the clinical trial.

Blood samples were drawn at the beginning of therapy for immunological, hematological, and biochemical indices. Hematological and Biochemical indices were measured on monthly basis while immunological indices were done at the beginning of the clinical trialand three (03) months.

Study Setting

The study was conducted in Zambia at Maina Soko Military Hospital (MSMH). Maina Soko Military Hospital is situated in Woodlands in the city of Lusaka. The hospital is about 10 Km from the city center. The clients that attend the hospital are both military and civilians. The hospital accommodates the Family Support Unit (FSU), an HIV services center of excellence, which will be the study site.

Sample and Sample Size

There were close to 2,500 clients under care, and this formed the sampling framework from which the study sample was derived; the simple random sampling method was used to select the study participants. The participants did not depend on any of the investigators either as students, as employees or in any other ways. The target populationconsisted of male and female HIV positive clients aged between 18 and 55 years.

Sample size was calculated using the formulae below:

$$Sample\ Size = \frac{Z^2 P(100 - P)}{d^2}$$

Where: P = Proportion of estimated participation with HIV Infectiond = Sampling Error.

The power of power of the study will be expected to be 80 % or more.

The proportion of the clients taking part in clinical trials was estimated at 15 %, Z = 1.96 and the sampling error 5 %.

Therefore:

$$Sample\ Size = \frac{(1.96)^2 \times 15 \times (100 - 15)}{5^2}$$

$$= \frac{3.84 \times 15 \times 85}{25} = 196$$

Data Collection

The study was conducted from 8 – 12 hours in the morning and 14 – 16 hours in the afternoon on all working days starting from Monday to Friday. A coded questionnaire was prepared covering demographic information, socio-economic, haematological, biochemical, and immunological indicators of the participants.

Assessment

Efficacy

Primary

Improvement in immune response was measured by increase in CD4 Cell count and CD4/ CD8 ratio.

Secondary

Clinical benefit was assessed by changes in total body weight, karnofsky performance score, and amelioration of signs and symptoms of disease present at baseline including the remission or occurrence of opportunistic infections.

Safety

Vital signs, laboratory tests, clinical adverse events (AEs).

Procedures (Summary)

Complete pretreatment medical history, general physical and laboratory examinations prior to Babao relief capsule administration, then every four (04) weeks up to end of study. Symptom directed physical and vital signs will be conducted during four (04) weeks of follow up after therapy.

Data Processing and Analysis

The Epi-Info version 4.1 and SPSS software was used.

1. Design a questionnaire for data entry.
2. Enter data using Epi-Info.
3. For data Analysis, Chi-square and the student t-test were used in the analysis of the results.

Ethical Consideration

Approval was obtained from the ethics committee of the Zambia Defense Force Medical Services (ZDFMS) and University of Zambia (UNZA). Informed consent was obtained, and anonymity was maintained as regards the names of the subjects to preserve theirconfidentiality. Clearance was obtained from the Ministry of Defence to conduct the study.

Pilot Study

A Pilot Study was conducted using 10 participants at Maina Soko Military Hospital. This was used for redesigning and eliminating certain variables.

Prior to the pilot study the questionnaire was evaluated for face validity to assess whetherthe

questionnaire “looks valid” to the interviewees who took it and the administrator of thetool, and other technically untrained observers.

Research Outcomes

1. Improvement in immune response measured by increase in CD4 Cell count and CD4/CD8 ratio.
2. Clinical benefit assessed by improvement in the general physical wellbeing of the participants.
3. Improvement in immune function by reduction of viral load counts, leading to improvedquality of life of the patients.
4. Once the efficacy and safety of Babao Relief Capsule has been established, it shall be made available for use by our clients beyond the trial period.

Results

The study included males 118, (60%) and females 78 (40%) of the age groups rangingfrom 25-29 to those over 50 years. The 196 participants were included in the analysis with 104 participants being on the intervention arm and representing 53.1% of the trial population. In terms of the quality of life for the participants at baseline, 57% of the participants were in good health with a karnofsky score of 100%. This was one of the indicators in the exclusion criteria, those who were too sick were not included in the study. In line with the quality-of-life score, 62% of the participants were in World Health Organisation (WHO) HIV disease staging stage one (WHO Stage 1). In the summary statistics the median was used as the data was skewed.

The improvement of the immune system was measured by the CD4 increase. In the clinical trial, regardless of the arm where the patient was, the CD4 showed a steady increase over time. This started with a median of 267 at baseline (day 0) and rose to494 by the twelfth month (day 360). This is demonstrated in figure one and table one below.

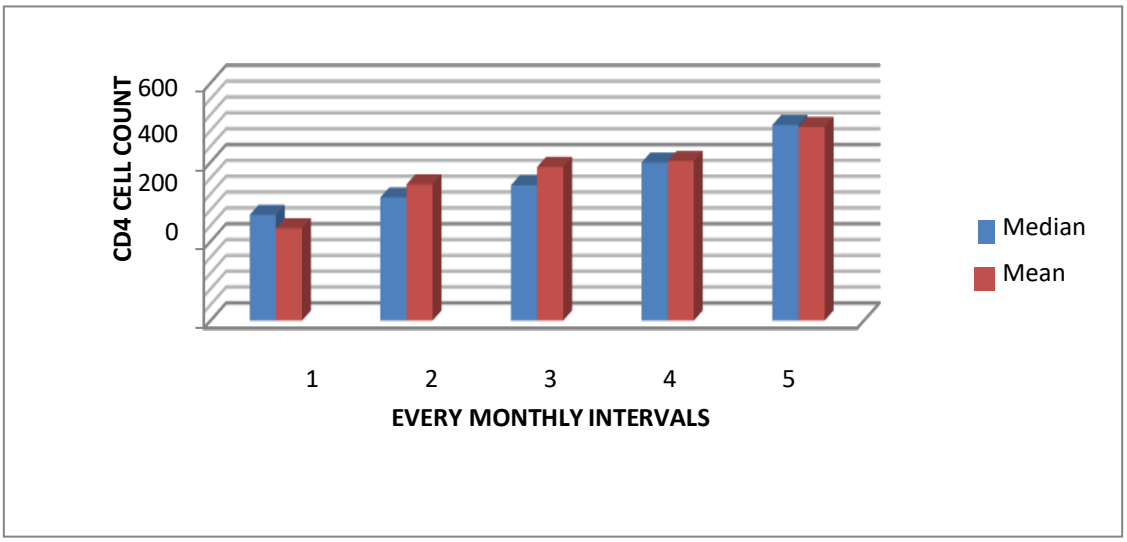

Figure 1. CD4 Increase Over Time in All Study Participants

Table 1. CD4 Trends Over Time in the Entire Trial Population

CD4	Min	Max	Median	Mean	STD Dev
1=CD4D0	19	452	267	233	126
2=CD4D90	63	765	311	344	191
3=CD4D180	183	667	432	388	161
4=CD4D270	150	621	399	403	144
5=CD4D360	282	766	494	489	160

The other indicator of immune system improvement was the viral load, demonstrated by the drop in the viral load over time. The median viral load was 72846 at baseline (day 0) and fell to 40 by the twelfth month (day 360). This is demonstrated in figure one and table two below.

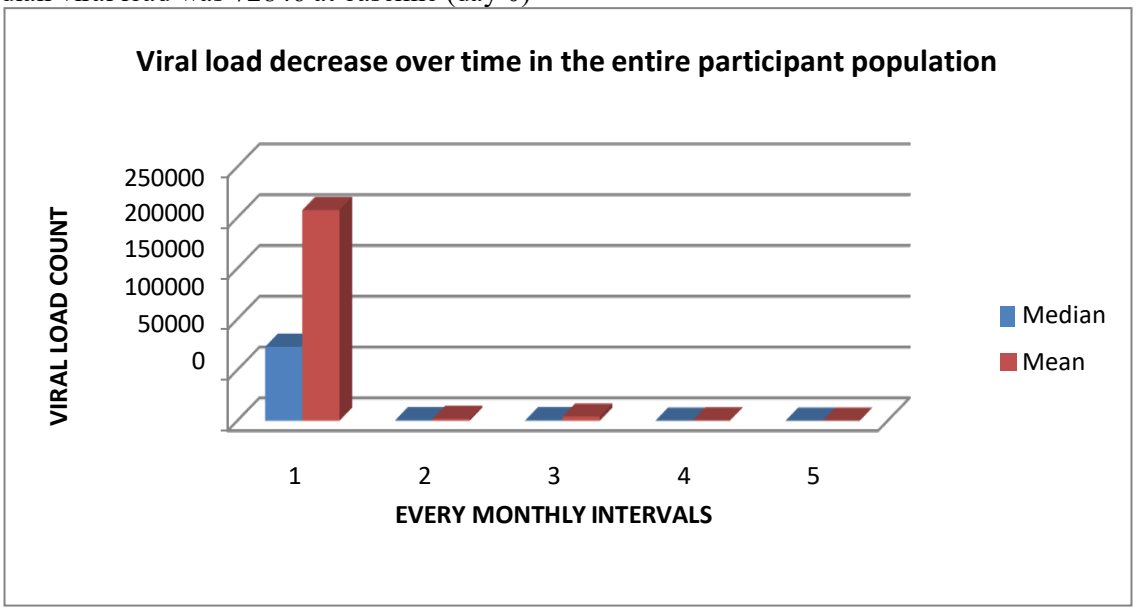

Figure 2. Viral Load Over Time for the Entire Trial Population

Table 2. Viral Load Over Time for the Entire Trial Population

Viral load	min	max	median	mean	Std dev
1 = Vl0	40	2,083500	72846	207485	407428
2 = Vl90	40	11808	606	1817	3018
3 = Vl180	40	41370	597	4181	11050
4 = Vl270	40	2885	143	421	832
5 = Vl360	40	323	40	92	113

In general, the indication was that all the patients in the clinical trial showed improvement in the immunity as shown by both the CD4 cell count increase over time and viral load drop over time. However, the picture was different when it came to weight, this variable was not very consistent and did not demonstrate any improvement.

In finding the difference between the interventional arm and control arm, the efficacy of BRC when used in combination with HAART compared with HAART when used alone. At baseline the median CD4 cells count was 213 in the control arm and 279 in the treatment arm. On day 360 the CD4 cell count in the treatment arm was 545 while the CD4 cell count in the control arm was 433. The CD4 cell count showed gradual improvement in both arms, however, the BRC with HAART combination demonstrated a consistent rise in CD4 as shown in figure four. The difference was significant with a p- value of 0.004, as shown in Table 5 below.

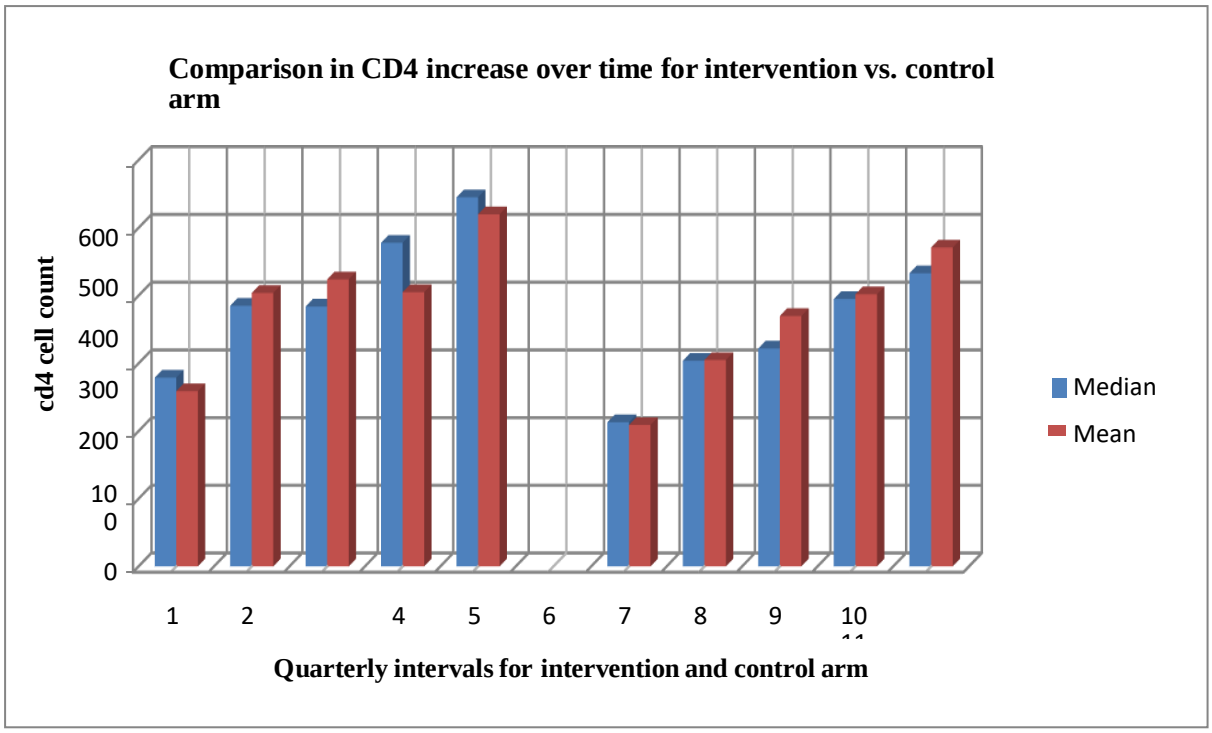

Figure 3. Comparison in CD4 Increase Over Time for Intervention vs. Control Arm

Table 3. Comparison in CD4 Increase Over Time for Intervention vs. Control Arm

Variable	Intervention Arm	Control Arm
CD4	Median	Median
D0	279	213
D90	385	304
D180	384	322
D270	478	395
D360	545	433

Table 4. Comparison CD4 Increase in the Intervention Arm Vs. Control Arm

Variable	Arm	N	Mean	SE Mean	StDev	Q1	Median	Q3	p-value
CD4	I	104	520	6.723	25.119	525.250	545	575.750	0.004
	C	92	471	5.258	20.394	410.500	433	450.000	

The viral load at beginning of the clinical trial was 302525 copies in the interventional arm and 88685 copies in the control arm. Both arms demonstrated a drop, but this was slightly more in the intervention arm, there was a significant drop in the viral load by the third month in both arms, 25207 copies and 912 copies respectively. Though in the controls, a blip was observed in viral load after twelfth month, there was a rise in viral load from 912.7 copies to 11072 copies after what looked like suppression, this was again followed by a fall in viral load to 597.6 copies. At the end of the clinical trial the viral load was 49 copies in the intervention arm compared to 134 in the control arm. The difference between the interventional arm and control arm was significant with a p-value of 0.013.

Table 5. Viral Load Over Time in the Intervention Arm Vs. Control Arm

Viral load	Control Arm	Intervention Arm
	Median	Median
D0	88685	302525
D90	912.7	2520.7
D180	11072	351
D270	597.6	113.5
D360	134	49

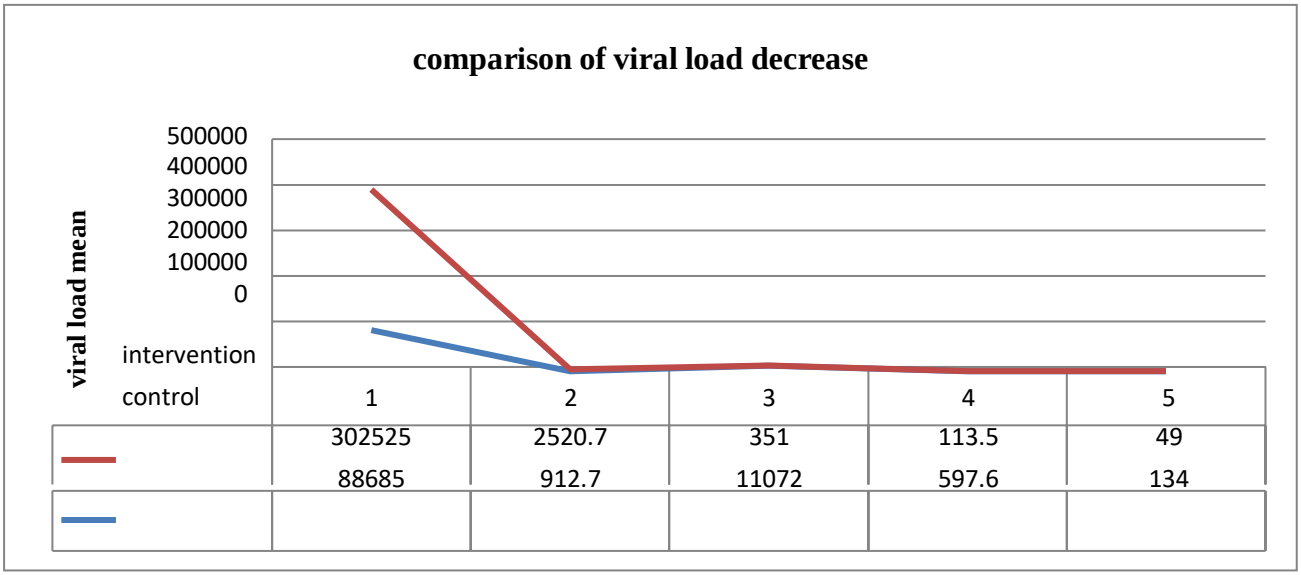

Figure 5. Viral Load Over Time in the Intervention vs. Control Arm

Table 6. Viral Load Over Time in Intervention Arm vs. Control Arm

Variable	Arm	N	Mean	SE Mean	StDev	Q1	Median	Q3	p-value
Viral load	I	104	60	1.723	5.119	25.250	49	75.750	0.013
	C	92	148	2.258	10.394	110.500	134	150.000	

There were no adverse events in the clinical trial, the surrogate markers for liver function test, renal function test and glucose remained within the normal range range withno red flags. See table 7 below.

Table 7. Hematologic and Chemistry Indices in Intervention Arm vs. Control Arm

Variable	Intervention Arm	Control Arm
HB (g/dL)	Median	Median
D0	13.9	13.5
D90	14.1	13.7
D180	14.0	13.6
D270	14.2	13.8
D360	545	433
Urea (mmol/l)		
D0	3.9	4.1
D90	4.1	4.3

D180	4.0	3.9
D270	4.2	3.8
D360	41.3	4.5
AST (U/L)		
D0	29.8	25.6
D90	32.1	26.5
D180	30.1	28.6
D270	29.5	27.5
D360	28.1	26.8
Glucose (g/dL)		
D0	4.5	4.8
D90	4.6	5.3
D180	5.2	4.9
D270	5.1	5.2
D360	5.6	4.9

In terms of clinical benefit assessed by improvement in the general physical wellbeing of the participants, the analysis focused on weight. The median weight at the beginning of the clinical trial was 59 kg and 63 kg at the of the twelfth's month, it did not show any significant fluctuation over the period of follow-up, as seen in table 8 below.

Table 8. Weight of All the Participants Over Time

Weight	Min	Max	Median	Mean	STD Dev
D0	44	89	59	62	11.4
D90	46	84	61.5	62.5	11.3
D180	53	80	60	63.8	9.6
D270	45	85	62	64.2	10.7
D360	43	76	63	62	10.6

Discussion

World over, HIV/AIDS service organisations have recognised that people affected or infected by HIV are increasingly choosing to use complementary and alternative medicine to cope with the disease. With the advent of HAART people infected with HIVcan now live normal lives as it has now become a controllable disease with lifelong implications for management of people living with HIV and AIDS. Insufficient evidenceexists to support the use of a particular complementary and alternate therapy to enhance the management of HIV disease. Safety risks and potential drug interactions are frequently ignored as people who use highly active antiretroviral therapy prefer to focus on the physical and mental benefits of using selected complementary and alternate therapies to promote their quality of life.

The clinical trial participants who were on Babao Relief Capsule and Highly Active Anti-Retroviral Therapy (HAART) showed a steady increase in the CD4 count. The difference in the intervention arm and control was significant with a p-value of 0.004, this indicates that the addition of Complimentary and Alternatives Medicine (CAM) to HAART increases the potency of HAART. This is supported by the fall in the viral load in the intervention arm as compared to the control arm, in this case the fall in the intervention arm was significant as

compared to the control arm, the p-value was 0.013.

The hematologic, liver function and renal function indices remained within the normal range, no red flags were observed throughout the period of follow up, this indicates that the combination of CAM and HAART did not have adverse effects on the target organs in the participants.

Clinical benefit assessed by improvement in the general physical wellbeing of the participants, the analysis focused on weight. The weight, however, did not give the bestparameter in terms of predicting improvement on therapy. This could be that the patients were already in good health as the clinical trial was only recruiting stable participants.

This clinical trial is a bridging study of the phase 1 clinical trial which was conducted in Malaysia, 31 patients took part in the clinical trial. In the Malaysian clinical trial BRC showed efficacy in the participants although HAART was not administered. The viral load was substantially lowered by 60%. There was a steady increase in the CD4 count. TakingBabao Relief Capsule for 1-2 months showed a reduction in opportunistic infections and HIV/AIDS complications. Within 2-3 months, CD4 and CD4/CD8 rose considerably. The HIV viral load was reduced to undetectable level in 3 months. This is consistent with the findings that in BRC and HAART clinical trial, showing evidence that BRC has boosting effects on HAART.

Conclusion

There was general improvement in the immune response for the overall population regardless of what arm of the study they were randomized to. This shows the general efficacy of the HAART drugs. However, the interventional arm showed a significant increase in the CD4 cell count, showing that BRC had booster effects in the efficacy ofHAART. This is supported by the decrease in the viral load which was significant in the interventional arm. The viral load decrease was sharper in the intervention arm and more towards clearing or towards zero.

The general wellbeing as measured by the weight of the patients was not very informative. The weight did not give the best parameter in terms of predicting improvement on therapy. This could be that the patients were already in stable healthas the study was only recruiting stable patients in WHO Stage one.

The combination of BRC and HAART did not produce any adverse effects, therefore it issafe to conclude that it is safe to use BRC as an Adjuvant in the treatment of HIV patients.

It may be premature to conclude on the efficacy of BRC however the complimentary medicine may have potential booster effect that seems to impart the steady CD4 increase, and predictable viral load decrease compared to HAART alone. A larger studywould be ideal to confirm the findings in this clinical trial.

Recommendation

1. There seems to be boosting effects of the highly active antiretroviral therapy when used with Babao relief Capsule, but use should be guarded.
2. There will be a need for phase three clinical trials so that the findings can be extrapolated to the rest of the population.

Conflict of Interest Statement

The authors declare no conflicts of interest.

About the Author

Brig Gen Dr. Lawson F. Simapuka is an experienced medical director with a demonstrated history of working in the hospital, health care industry, academics, and forensics. Skilled Infectious diseases, forensic medical sciences, epidemiology, program evaluation and organizational leadership. Has made pivotal contributions to tropical medicine and clinical research. Now serving as ExecutiveDirector of the National Forensic Authority in Zambia.

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Analysis of Health System for Health Security: Case of Burundi

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Abstract

Health system contributing to health security constituting an approach that harmoniously brings together efforts to strengthen the resources and capacities necessary for the implementation of the International Health Regulations, the components of health systems and those of other sectors for effective management of health emergencies, while maintaining the continuity of essential health services. The countries that have a weak health system face many challenges related to health security. A descriptive study was used during this study to identify if Burundi health system is contributing to the health security. 5health zones have been selected and 350 individuals questioned if they have received health education related to diseases with epidemic potential and if they have suffered from them. A questionnaire which includes the diseases with epidemic potential was distributed to 350 respondents between 20 to 55 years old. The majority (58%) of the respondents were female compared to 42% male. Most (93.0 %) respondents have received health education related to prevention of diseases with epidemic potential. The result shows significant differences in location, gender, marital status, occupation, and several outbreaks (P<0.001). The future research should focus on the re-organization of health systems to respond effectively to different heath threats, especially these can spread locally and globally. Identification of all these issues that can spread to neighbors, and which can cause high morbidity and mortality. of the country, the gaps, and priorities and to know where to convey the efforts for universal health coverage.

Keywords*: Burundi, Epidemic potential, Health system, health security, prevention.*

Introduction

The world is increasingly interconnected and interdependent. People, goods, and related services move easily and quickly between regions and countries. This has contributed to the complexity of achieving national and global health security and brings both challenges and new opportunities [1].

This article is aimed to highlight how Burundi health system is. The article will guide the government, Burundi partners and other people working in health sector and readers what should be done to strengthening the health system for Universal Health Coverage [2].

Burundi as a developing country is facing many challenges related to disease prevention and control. The public health events of greatest concern are those that can cause locally and spread globally [3]. Burundi should have sufficient capacity in terms of preparedness to provide an effective response to serious and large-scale public health emergencies. Major events that Burundi should be prepared include the diseases that have pandemic and epidemic potential such as malaria, COVID-19, Ebola, Cholera, and many others [4].

The country has different needs when it comes to ensuring that it can mobilize resources to respond adequately to health emergencies in

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addition to their usual demands for health services.[5] It needs support to rapidly develop technically skilled and specialized human resources, given the vital role of health personnel in health systems when they become operational, acts to respond to health emergencies. Finally, Burundi struggles to procure the medical equipment and medicines needed to meet the surge in demand during pandemic, due to intense competition [6]

The government of Burundi needs to strengthen and invest in health system, to build a system that is reliable, sustainable, and capable of delivering while improving health security nationally and globally [7].

Establishing and strengthening Burundi health system involves a complex set of conceptual and practical. To these ends, a clear and common narrative and a well-defined framework are needed to build resilient and responsive health system. There is also a need to reinforce messages about investment in food safety, returns and expected outcomes [8].

The Ministry of Health of Burundi should better know and understand (i) what capacities are required for resilient and responsive health system for health security? (ii) Where are the intersections between health system, health security and other sectors, and (iii) how the challenges to these intersections can be overcome and the opportunities exploited for effective multisectoral and multidisciplinary management of health emergencies [9].

Methodology

The methodology describes the research design, population and the sampling procedure used. The instrument for data collection, data collection procedure, data analysis procedure, validity and reliability of the instruments are also described in detail in this part of the study.

Research Design

A descriptive design was used for this study. The data related to the organization of Burundi health system for the study was collected related to the organization of Burundi health system to find if that health system is contributing to health security. The data was gathered in 2022 from the Ministry of health of Burundi and many health experts operating in Burundi have been as well consulted.

Study Area

The research took place in Burundi in the Ministry of health. The study is related to how the Ministry of Public health of Burundi is organized and if this organization is contributing to national and global health security. Burundi's health system is organized in a pyramidal form, and it is articulated on 4 levels: the central level, the intermediate level, the peripheral level, and the community level.

This system should be able to prevent, diagnose, treat, and control events that may affect twelve millions of Burundian specially the diseases that have pandemic and epidemic potential. Burundi is a Central African country member of the East African Community. It borders to the north with Rwanda, to the south and east with Tanzania and to the west with the Democratic Republic of Congo (DRC) [10].

Its area is 27,834 km2 including the surface of territorial waters. It is the third most densely populated country in Africa. The population of Burundi is estimated at 12,309,600 inhabitants, a density of 442 inhabitants/km² in 2020 according to demographic projections from the data of the general population and housing census of 2008. The population growth rate is 2.4% (RGPH 2008). In 2018, he ranked 15th place (0.423) out of 189 countries according to the Human Development Index1 [11]. Nearly 72.9% of their population live below the poverty line. Poverty is rural (71.1%) and affects small farmers. Burundi had 1,182 functional health centers (HCs), including 658 public HCs, 340 private HCs, 144 confessional HCs and 40 associative HCs [12].

Study Population

The focus of the study was the structure of the Ministry of Public Health of Burundi and if that structure is contributing to the population health security. Several workers of the Ministry of Public Health and experts operating in that sector have been consulted to understand the organization of Burundian health system. The following groups of people have been contacted:

1. Decision-makers and public health experts of Burundi responsible for defining coordinate and implement health security strategies. This is not limited to the Ministry of Health, but includes stakeholders from other sectors who are involved, in one way or another, in the management of health emergencies.
2. Partners and donors who support and fund health security capacity building or health systems development.
3. Academic and research institutions interested or involved in research aimed at generating data for the effective management of health emergencies.
4. Other institutions and community leaders are interested or likely to participate in the management of health emergencies. Health system contributing to health security must consider the objectives of UHC (all individuals must be able to access good quality health services at an affordable cost) and those of health security (reducing vulnerability to serious public health situations that endanger the collective health of populations, including across geographical borders).

Inclusion Criterion

Health professionals and workers that have the responsibility of decision making and supporting health system management.

Exclusive Criterion

Health professionals and workers who are not involved in decision making, cannot intervene in health system organization.

This involves a health system that can resist, absorb, respond, adapt, and recover from the effects of health emergencies quickly and effectively.

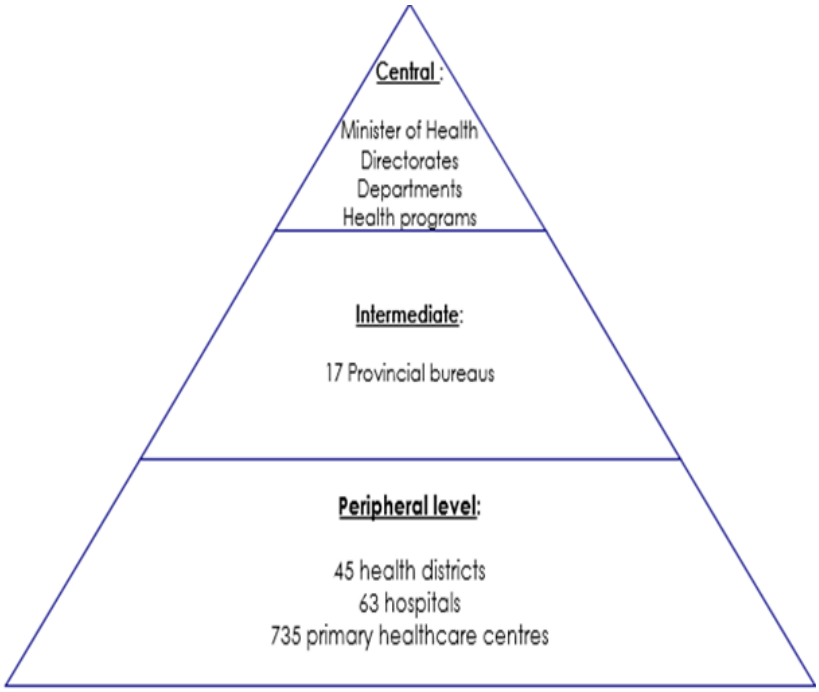

Figure 1. Burundi's Hierarchical Health System Structure [13]

The government of Burundi needs to establish a good health system that contributing to health security for the following objectives:

1. Defining the essential components of health systems and other sectors that play an important role in coping with the demands imposed by health emergencies.
2. Defining, prioritizing, and monitoring actions and investments in health security, health systems and other sectors for a multisectoral and multidisciplinary management of health emergencies for better global health security.
3. Welcoming partners and donors better support the country in strengthening health security by identifying where more investment in health systems is most needed, how best to do it, and how funding can be maintained.
4. Highlighting the challenges related to the implementation of health systems contributing to health security.
5. Preventing the population against health threats.
6. Preventing local diseases from spreading globally.
7. Mitigating and controlling health threats when occurred.

Research Questions

The research will help to answer the following questions:

1. Is there health system in Burundi?
2. How is Burundi health system structured?
3. Are there partners supporting Burundi to strengthening health system?
4. What are the most health threats that Burundi health system should combat?

Research Objectives

General Objective

1. Analysis on Burundi health system.

Specific Objectives

1. Overview Burundi health system.
2. Organisation of Burundi health system.
3. Burundi health threats (Diseases).
4. Compare health system of Burundi and other developed countries.

Ethical Consideration

This research does not require ethical consideration but the permission for data collection has been guaranteed by different personalities of the Ministry of Public Health before data collection.

Reliability and Validity

The data collection tool, the questionnaire was pre- tested before the actual data collection. This tested the validity and reliability of the instruments used during data collection.

Results

The crude mortality rate is 10.27 per 1000 inhabitants with life expectancy at birth of 59.7 years in 2020.Epidemiologically, the country faces the double burden of communicable diseases and non-communicable diseases. It also has an increased vulnerability to public health emergencies and malnutrition. The maternal mortality ratio increased from 500 to 334 maternal deaths per 100,000 live births between 2010 and 2017 [14]. A part of these challenges, Burundi has made progress in child health with an infant and child mortality rate falling from 96 to 78 deaths per 1000 live births. The data collected showed that the neonatal mortality rate fell from 31 to 23 deaths per 1,000 live births from 2010 to 2017.Compared to the implementation of primary health care, the rate of fully immunized children is 79.5% in 2019.The rate of assisted deliveries is 98.6% (DHIS2), the coverage rate in ARV in adults is 82.8% and in children it is 32.6%.[15]The therapeutic success rate against tuberculosis is 94%.The government of Burundi through the Ministry of Public Health and partners needs to strengthen the health system in order to correct the negative health indicators[16].

Table 1. Burundi Mortality Rate (2011-2021)

Date	Death s	Mortality Rate
2021	93.808	7,47‰
2020	92.409	7,56‰
2019	87.304	7,35‰
2018	87.902	7,65‰
2017	86.701	7,77‰
2016	86.135	8,18‰
2015	87.275	8,55‰
2014	87.162	8,80‰
2013	88.274	9,18‰
2012	89.792	9,63‰
2011	91.331	10,09‰

On the other hand, there is a need for reinforcement in terms of health promotion: food and nutrition, access to water (only 58% of the population has access to drinking water less than 30 minutes away) and sanitation (Less than 44% of Burundians use improved non-shared toilets). The country cannot reach health security without reinforcing the sector of water and sanitation as many diseases are prevented by hygiene [17].

Table 1 shows the mortality rate between 2011 up to 2021.In short, the mortality rate has decreased compared to 2011(10,09 0/00.) [18].

In relation to access to essential health services, despite the progress made in recent years, significant deprivations persist and undermine health rights.

During my research, the essential health services coverage index was 43 in 2016 against a target of 80.

Organization of Burundi Health System

Burundi's health system is organized in a pyramidal form and is articulated on 4 levels**:** the central level, the intermediate level, the peripheral level, and the community level [19].

Partnership for Health and Development

The coordination of the health sector is done through a consultation framework for health and development partners (CFHD) created in 2007 with a view to synergizing the interventions of all the actors of the health system. Working Groups (WG) have been set up to feed the strategic discussions of the CFHD. These five WGs cover the following areas: (i) WG 1: Health services and the fight against AIDS (with supply and demand for; Programs/projects; Health promotion ; Hygiene ; Sanitation); (ii) WG 2: Drugs, pharmacy, laboratory; (iii) WG 3: Planning and Monitoring-evaluation; National Health Information System); (iv) WG 4: Resources (with Human Resources; Budget; infrastructure; Equipment; (v) WG5: Mother-Child Health/Vaccination which plays the role of Inter-Agency Group for Vaccination[20]. Effectively managing aid in the health sector, a diagnostic on the functioning of the CFHD was carried out by the MSPLS with the technical support of the WHO in 2018 and strengths and weaknesses were identified in order to adapt its architecture to the new environment Short- and medium-term recommendations have been made to improve its operation to maintain these achievements and face the new challenges posed by the implementation of UHC to achieve the SDGs [20].

As part of the fight against malaria, tuberculosis and HIV/AIDS, there is a National Authority responsible for coordinating Global Fund grants. This body monitors the implementation of grants, the mobilization of resources and the alignment of Global Fund

financing with programs and projects financed by other partners to guarantee sustainable actions. For HIV/AIDS, there is the CNLS, which is the multisectoral coordination body for the national response to HIV. Its technical body is the SEP-CNLS [21]. The public-private partnership also contributes to health action.

Health centers, hospitals and private clinics contribute to improving the supply of care and services at the national level. According to data from the 2019, the private sector represents 47.16% for health centers (private, denominational, and associative) and 63.57% for hospitals including clinics and polyclinics [22].

Table 2. State Budget Allocated to Health in BIF

Ministry	**Budget 2012**	**Budget 2013**	**Budget 2014**
MSPLS	68 453 546,62	74 352 093,46	78 835 358,03
Ministry of higher education and scientific research (CHUK)*	2 659 052,88	2 733 600,30	2 565 600,30
Ministry of National Solidarity, Human Rights and Gender (CNAR, Indigents)	**1** 631 318,70	1 816 195,41	36 247 707,00
Ministry of Public Security	1 289 164,99	1 385 164,99	1 385 164,99
Ministry of National Defense and Veterans Affairs (HMK.)	2 037 395,13	2 135 620,36	2 231 620,36
Total budget allocated to health (1)	76 070 478,32	82 422 674,52	85 053 991,39
Total state budget (2)	779 917 598,84	779 282 641,31	813 077 734,03
Percentage of budget that is allocated to health (1 / 2)	9,75	10,58	10,46

For the 2015 and 2016 budgets, the provisional budget laws show a decrease in the proportion of the budget allocated to health. The share of the national budget devoted to health is respectively 10.8%; 13.6% for the budget years 2019-2020 and 2020-2021 [23].

Table 3. Health Human Resources Have Evolved in Quantity and Over Time as shown in the Following Table

Categories of Human Ressources	**Workforce in 2010**	**Ratio RH/Pop**	**Workforce in 2017**	**Ratio RH/Pop**	**WHO Norms**
Nurses	5967	1nurse/1.586hab.	7332	1nurse/1.568hab.	1nurse/3.000hab.
Doctors	418	1Dr /22.634	647	1Dr /17.768hab.	1Dr /10.000hab.
Mid wifes	16	1mw/141.190 Women aged procreate	103	1SF/27.080 Women aged procreate	1mw/5.000Women aged procreate

This Table 3 that the nursing staff is sufficient according to WHO standards. However, these nurses are unequally distributed over the Burundian territory, the urban and semi-urban areas being more served than the rural areas. In addition, human resource needs, particularly for doctors and midwives, remain significant. In addition, the analysis of the

density of health personnel is 0.7, while WHO standards provide for 2.3 qualified personnel (doctors, midwives, and nurses) per 1,000 inhabitants.

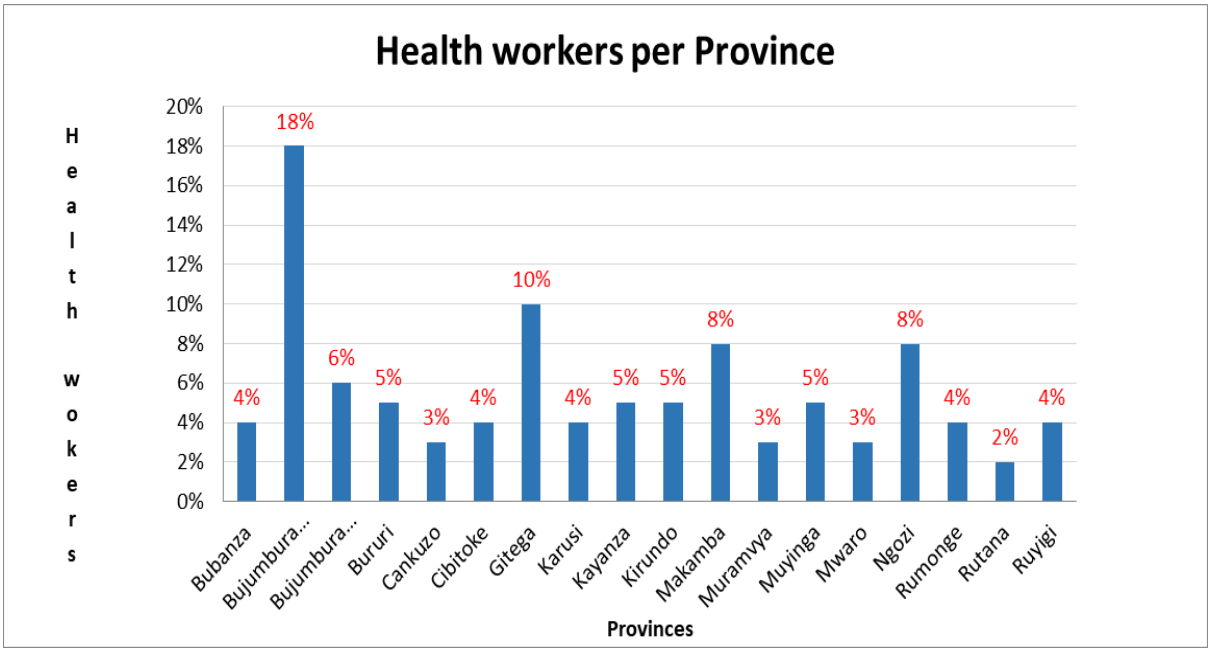

Figure 2. Distribution of Public Sector and Licensed Health Personnel by Province (HRs Mapping: 2017)

Directorates, Programs and Health services

According to Decree No. 100/093 of November 9, 2020, on the organization and functioning of the MSPLS, there are Departments / Directorates at the central level in different general directorates as describe in the Table 4:

Table 4. Structure of Burundi Health System

Directorate General for Health Services and the Fight against AIDS	**Directorate General of Planning**	**Directorate General of Resources**	**Directorate General for the provision of modern and traditional medical care**
Department of Health Promotion, Care Demand, Community and Environmental Health	Department of Planning and Monitoring- Assessment of Health policies	Human Resources Department	Accreditation Department
Department of Medical Biology Laboratories	Department of Health Information System	Budget and Procurement Department	Department of Care Quality Assurance, Hygiene and Safety in the Workplace care
The National Technical Unit and Performance-Based Financing		Department of Infrastructure and Equipment	Directorate for the Promotion of Traditional Medicine, Balanced Diet and Natural Diet for Therapeutic

		The Unit Responsible for Public Procurement	Purposes
		The Unit Responsible for Logistics and Carriage	

Based on the situation and the epidemiological scale, the country has implemented specific programs to strengthen interventions relating to certain health issues.

Thus, Burundi currently has 9 vertical programs listed below:

1. The National Integrated Malaria Control Program (PNILP).
2. The National Integrated Food and Nutrition Program (PRONIANUT).
3. The National Integrated Leprosy and Tuberculosis Program (PNILT).
4. The Expanded Vaccination Program (EPI).
5. The National Reproductive Health Program (PNSR).
6. National Program for the Fight against AIDS and Sexually Transmitted Infections PNLS/STI.
7. The National Integrated Program for the Fight against Chronic Non-Communicable Diseases (PNILMCNT).
8. The National Integrated Program for the Fight against Neglected Tropical Diseases and Blindness (PNIMTNC).
9. Health System IT Management Program (PROGISSA).

Discussion of Results

Burundi health system is Burundi's health system is organized in a pyramidal form and is articulated on 4 levels.

The central level is responsible for defining health policy and developing intervention and planning strategies, as well as defining and evaluating quality standards for health care and services.

The intermediate level is made up of 18 Provincial Offices for Health and the Fight against AIDS. These are responsible for coordinating health activities and the fight against AIDS at the provincial level.

The peripheral level is made up of 47 health districts. These are governed by a district executive team (DET) within the Office of the District Health and Fight against AIDS. Their responsibility is to ensure decentralized planning, to ensure the delivery of quality care and to ensure the proper functioning of Health Centers (HCs), associative structures for the fight against AIDS and health promotion and hospitals.

The community level provides a package of activities made up of promotional, preventive, and curative care. It includes local associations, health committees, community health workers, traditional midwives, and traditional healers. Come together in a group of Community Health Agents (GCHA) and play the interface between the community and the health centres. Traditional medicine has been used to improve people's well-being and it continues to play a vital role in health care in Burundi.

The traditional medicine is not yet integrated into Burundi health system, advances in this area need to be mentioned particularly:

1. The celebration of the African day dedicated to traditional medicine since 2003 until today.
2. The signing by His Excellency the President of the Republic of Burundi of Decree Law No. 100/253 of November 11, 2014, regulating traditional medicine and the art of traditional medicine.
3. The implementation of ministerial orders for the application of the said decree towards the end of 2018.

4. The existence of the database of all traditional healers grouped together within the Directorate for the Promotion of Traditional Medicine, Balanced Diet and Natural Diet for Therapeutic Purposes.
5. The establishment of the National Network of Associations of Traditional Practitioners and provincial branches of this network.
6. The existence of the laboratory for the analysis of the active ingredients contained in traditional medicines at the INSP.
7. The creation of the Directorate General for the Offer of Care, Modern and Traditional Medicine, Food and Accreditations which dates from 09/11/2020 with Decree No. 100/093 on the organization and functioning of the Ministry of Public Health and the Fight against AIDS.

Despite the efforts already made in this area, major challenges remain:

1. The large-scale cultivation of medicinal plants is increasing.
2. Integration of traditional medicine data into the national routine health information system.
3. Lack of reagents to analyze the active ingredients contained in traditional medicines at the INSP.
4. The state budget allocated to traditional medicine is very minimal.
5. The reluctance of traditional healers to collaborate for information useful to research.
6. The texts and standards governing traditional medicine have not yet been drawn up.

Burundi had 1,182 functional health centers (HCs), including 658 public HCs, 340 private HCs, 144 confessional HCs and 40 associative HCs. The HC is the gateway to the care network and offers a minimum package of activities (MPA) including promotional, preventive, and curative care. It should be noted that certain preventive, promotional and curative care is offered at the community level under the supervision of the HCs with the support of community health workers (CHWs).

As for hospitals and clinics, there were 149 of which 51 public, 28 religious, 69 private and 1 associative.

One in two households (49%) takes less than 30 minutes to access a health facility, 46% use between 31-120 minutes, while 5% say they use more than 120 minutes. The District Hospital is the first referral level and offers a complementary package of activities (CPA) for patients coming from HCs. In addition to District hospitals, there are public, professional, and private hospitals offering a package comparable to that of the district hospital. The country has 44 district hospitals.

However, three (3) health districts (Vumbi, Busoni and Nyabikere) do not have district hospitals.

The regional hospital is defined as a second referral level that receives patients from district hospitals. The country has 5 regional hospitals, namely: Bururi, Mpanda, Ngozi, Gitega and Rumonge Hospital.

The National Hospital constitutes the apex of the healthcare network and offers specialized services. There are seven (7) of these National Hospitals, of which six (6) are in the economic capital, which causes a problem of equity: Hospital Prince Regent Charles, Prince Louis Rwagasore Clinic, University Hospital Center of Kamenge, Military Hospital of Kamenge, Neuro-Psychiatric Center of Kamenge, National Police Hospital and Natwe Turashoboye of Karusi.

In terms of availability and access, all preventive and promotional services are subsidized. In addition, curative care for children under five and pregnant or giving birth has been free since 2006. This has boosted the use of health services with a rate of births attended by skilled personnel from 60.7% to 98.6% between 2010 and 2019.

To continue serving the national population, the government of Burundi is supported by partners like the World Health Organization

(WHO), International Monetary fund (IMF), the World Bank (WB) etc.

Table 1 shows the mortality rate between 2011 up to 2021.In short, the mortality rate has decreased compared to 2011(10,09$^{0}/_{00.}$). This means that the Burundi health system is trying its best to be more organized and ensure that all Burundi population and neighboring countries are safe.

Burundi has made enormous efforts to finance the health system. Data in this area are not updated, because the latest national health accounts date from 2013.

These showed the following situation: (i) decrease in household contribution to health expenditure from 40% in 2007 to 19% in 2013 (standard being less than 20%), (ii) establishment of prepayment mechanisms, in particular 100% financing of the CAM by the government with satisfactory adherence of 85% of the target of 90%, (iii) A health care cost study carried out in 2019 for a proposal for new pricing of medical and paramedical services, (iv) vaccination and care (children under 5, pregnant women, pathologies linked to pregnancy, tuberculosis and cases of uncomplicated malaria) are provided free of charge to beneficiaries, (v) the establishment of performance-based financing with a 1.4% increase in the overall government budget each year and extension in progress to the community level (the government's share is 32% in 2017), (vi) the establishment of an internal and external control and audit system.

The provisional budget laws show the decrease in the proportion of the budget allocated to health. The share of the national budget devoted to health is respectively 10.8%; 13.6% for the budget years 2019-2020 and 2020-2021.

The nursing staff is sufficient in Burundi according to WHO standards. However, these nurses are unequally distributed over the Burundian territory, the urban and semi-urban areas being more served than the rural areas. In addition, human resource needs, particularly for doctors and midwives, remain significant. In addition, the analysis of the density of health personnel is 0.7, while WHO standards provide for 2.3 qualified personnel (doctors, midwives, and nurses) per 1,000 inhabitants.

The structure of Burundi health system entailed of direct generals with different programs. Directorate General for Health Services and the Fight against AIDS Directorate General of Planning Directorate General of Resources Directorate General for the provision of modern and traditional medical care.

Each program has its specific area of work to contribute to the health security of the population.

A study on health financing in Burundi carried out in 2014 and was followed by the development of a national financing strategy which has not yet been validated?

These programs are structures at the central level which collaborate with the intermediate and peripheral levels for the implementation of specific interventions. These are structures that have a certain autonomy in decision-making, and which benefit from substantial support from technical and financial partners, in addition to government subsidies.

To strengthen the monitoring of peripheral activities, some programs have assigned focal points in the provinces and/or health districts to ensure close monitoring of the interventions carried out by the program concerned. However, it has the disadvantage of perpetuating the weak integration of program activities in the operation of the district with weak appropriation by the latter's officials. It should also be noted that the lack of program integration disrupts the planning and accounting of Provincial Health Offices (BPS), District Health Offices (BDS) and hospitals.

As part of the 2019-2023 PNDSIII, the strategic plans for health services and programs are aligned with national strategic orientations and strengthen the integrated care package for each level of the health pyramid. This package

includes high impact interventions with a quality assurance system.

According to the findings from the 5 health zones visited, the Burundian population are aware on how to protect themselves against epidemic diseases like malaria, cholera, Ebola, COVID-19, Marburg etc. The ministry of public health is well structured, and functions are well defined. In the country, the diseases of priority are known, and the government is doing all possible to fight against them. Health care professionals are sufficient even if most of them are concentrated in urban areas. To cope with this, it is very crucial to decentralize and deploy healthcare professionals in rural areas. There is an annual budget allocated to health projects and the government has partners to fund health projects again. The government of Burundi is also working with other international organization like World Health Organisation (WHO) to ensure the health security of all. Some of these organization provide technical expertise and other funds. The provision of health equipment remain a serious challenges for the government as there is no national factory that is trying to produce medical equipment, all medical equipment used in Burundi are from abroad and this makes a setback for achieving high quality health services. If the ministry of Public Health continues to educate the population on how to prevent diseases, especially with epidemic potential, morbidity and mortality will continue to decrease.

Burundi has a health system which is organized according to the needs of the population and the diseases to fight. This health system is organized in pyramidal of 4 levels, from the central level to the community level.

Burundi cannot function without support from other countries, and this is the reason why the country has partners that are supporting the ministry of Public Health in different health projects such as vaccination, health promotion, laboratory, research, supply chain and logistics, providing medical equipment and supplies, construction of health infrastructures and sponsoring the outside training for ministry of health.

The most health threats that Burundi health system should combat are these threats that may cause high morbidity and or mortality. In terms of disease, Burundi has put in priority to fight against some diseases. The most prevalent diseases in this category are malaria, HIV/AIDS, tuberculosis, diarrheal diseases, vaccine-preventable diseases, and acute respiratory infections. Diabetes and high blood pressure coexist in 30% of cases, according to a study done at the Kamenge University Hospital Centre and are responsible for 73.17% of degenerative complications.

The health situation in Burundi was precarious in 2008. The crude mortality rate was 15 per 1000 (2008 Population Census). This situation was associated mainly with the fragility of the health system, the heavy burden of communicable diseases, chronic noncommunicable diseases, neglected tropical diseases, the vulnerability of mothers, children and adolescents, and the role of the determinants of health (demographic pressure owing to a density of more than 310 people per km2, and very high rates of acute and chronic malnutrition, 6% and 58% respectively, in children between 0-5)[13].Comparing these data of 2008 to 2020 data, we can say that the health system of Burundi is capable to reduce, to fight against health treats for the health security of the population.

Conclusion

In an interconnected world, Burundi as a country needs to achieve the highest possible level of health security and maximizing international collaboration is vital, regardless of its development level. Many things have been achieved by the ministry of health to ensure health security of the population but to fully address health security requires new investments in health systems as well as other sectors. To be effective and efficient,

prevention, preparedness and response to emergencies need to rely on strong and resilient health system and reinforcement from other sectors to meet increased demands, adapt flexibly to changing needs and mitigate their impact on the provision of essential health services to recover rapidly or to achieve a new state of stability, particularly in the event of a protracted crisis. This requires a primary health care approach.

Recommendation

It is very crucial that Burundi government continues funding health projects to prevent and eradicate health threats specially that can occur locally and globally. Identify that issues that affect many Burundians. There is a need to proactively identify and respond to challenges for effective implementation of health systems contributing to health security.

Burundi ministry of health should work together with other health professional, organizations, and funds and improve international cooperation to build, strengthen and sustain capacity for effective health emergency management.

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Conflicts of Interest

The author declares no conflicts of interest.

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The Relationship Between Exposure to Digital Sexual Violence and Mental Health Outcomes: Insights from Namibia Violence Against Children and Youth Survey

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Abstract

Digital sexual violence correlates with cyberbullying victimization, leading to the manifestation of psychological distress and diverse forms of suicidality such as thoughts, attempts, and self-harm. The purpose of this study was to examine the prevalence and association between exposure to digital sexual violence and mental health outcomes (i.e., mental distress and suicide risk) for boys and girls aged 13 to 24 in Namibia. This cross-sectional study utilized national data from the 2019 Namibia Violence Against Children and Youth Survey (VACS) involving 5,191 participants, with 4,211 being girls and 980 boys. Chi-square tests were used to determine the prevalence estimates and significant association for bivariate, and two logistic regression models were applied to assess the significant association for multivariate. The prevalence results indicated that exposure to digital sexual violence was associated with higher rates of moderate/severe mental distress in the past 30 days (boys [64.5%] vs. girls [65.2%]) and increased lifetime risk of suicide (boys [27.4%] vs. girls [40.1%]). Similarly, regression results showed that exposure to digital sexual violence was associated with a higher likelihood of reporting moderate/severe mental distress in the past 30 days (boys: 95% CI = 4.67-22.09; girls: 95% CI =2.75-4.88) and a lifetime risk of suicide (boys: 95% CI =2.16-10.63; girls: 95% CI = 2.68-4.75). In order to reduce mental distress and suicide risk behaviors, interventions should include implementing a safer online environment through digital literacy programs, reducing stigma, offering mental health counseling services, and establishing crisis hotlines for victims of digital sexual violence in Namibia.

Keywords: *Boys, Digital sexual violence, Exposure, Girls, Mental distress, Namibia, Suicide risk.*

Introduction

The emergence of digital technology in the modern age has ushered in unprecedented opportunities for communication, social interaction, and information sharing, particularly for young people across the world [1, 2]. However, the digital landscape has also brought forth a new and concerning challenge: exposure to digital violence. In the context of Namibia, as in many other countries in Africa, this phenomenon has raised numerous questions about its potential impact on the mental wellbeing of the younger generations living in the digital era [2, 3]. Younger individuals are confronted with greater risks of exposure to digital sexual violence in Namibia [4]. About nine percent of the young people who use the internet have encountered some form of online sexual violence within the past year in Namibia [5]. These forms of violence include sextortion, wherein individuals could be blackmailed, sent inappropriate communication, coerced into engaging in unwanted sexual activities through the distribution of explicit media or threats to share sexually explicit content without their consent, and may be promised some financial

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gains or gifts in exchange with explicit sexual materials [5-7].

In recent years, there have been growing concerns about the potential psychological toll of digital violence, including cyberbullying, sextortion, and other forms of online harm for young people [8]. In the general population, it has been reported that digital sexual violence is frequently associated with cyberbullying victimization, which, in turn, is associated with psychological distress and various manifestations of suicidality, including ideations, attempts, and self-harm [9-13]. Although it has long been established that people who experienced sexual violence or victimization have severe consequences for being the victims, the impact of digital sexual violence on mental health is currently understudied and, to some extent, underestimated in many settings [14, 15]. In Namibia, fewer studies exist reporting incidents of various measures of online safety, sexual exploitation, violence, abuse, and awareness, as well as online gender-based violence [3, 4], and offers limited insights into how digital violence are linked to negative mental health consequences for young people [2].

Therefore, this study has two primary aims to bridge significant gaps in the literature: (1) Determine the prevalence of mental health outcomes (i.e., mental distress and suicide risk) across exposure to digital sexual violence, and (2) Assess whether there is an association between exposure to digital sexual violence and mental health outcomes (i.e., mental distress and suicide risk) for boys and girls aged 13 to 24 in Namibia. The rationale behind this study is the growing concern surrounding the psychological consequences of digital violence and the scarcity of research conducted in the Namibian context using nationally representative data. By investigating the link between digital sexual violence with mental distress and suicide risk, this study endeavors to illuminate the challenges faced by adolescents and youth in the digital era. This comprehension is vital to facilitate the identification of the challenges and the potential development of tailored interventions and support mechanisms to enhance the mental well-being of young people who may be victims of digital sexual violence in Namibia.

Methods

Study Design and Sampling

This study utilized the 2019 Namibia Violence Against Children and Youth Survey (VACS), which was conducted as part of the nationwide, cross-sectional survey. The purpose of VACS was to determine the prevalence and circumstances of childhood emotional, physical, and sexual violence in Namibia. The survey included males and females aged 13 to 24. The sampling strategy involved a three-stage cluster sampling approach. The initial stage randomly selected 274 primary sampling units (PSUs) from a total of 3,472 PSUs, utilizing geopolitical subdivisions from the 2010 Census and the 2016 Namibia Intercensal Demographic Survey. In the second stage, 25 households with at least one eligible 13–24-year-old were randomly chosen from each selected PSU. The third stage involved randomly selecting one eligible individual within each household for an interview. To maintain confidentiality and prevent potential bias, PSUs were randomly assigned to either female or male survey respondents using a split-sample approach. Additionally, girls were oversampled in three regions where the DREAMS program was active, which focuses on HIV prevention and empowerment for adolescent girls and young women: Khomas, Oshikoto, and Zambezi. In total, 4,839 households were surveyed in the female sample, with 4,211 females completing individual interviews, and 1,203 households were surveyed in the male sample, with 980 males completing individual interviews.

Eligibility Criteria

To be eligible for the participation in the survey, individuals had to meet the following criteria: (1) must be between the ages of 13 to 24

at the time of the survey; (2) must possess the ability to understand and speak English, Afrikaans, Damara/Nama, Oshiwambo, Otjiherero, RuKwangali, and/or Silozi; (3) must not have severe cognitive or physical disabilities that would hinder survey administration (determined by study staff during the consent and data collection processes); (4) must not reside in institutions such as hospitals, prisons, nursing homes, or similar establishments; and (5) must be residents of selected households.

Data Collection Procedures

The Namibia VACS survey was administered in multiple languages, including Afrikaans, English, Damara/Nama, Oshiwambo, Otjiherero, RuKwangali, and Silozi, consistent with other national surveys in Namibia. Data collection occurred between March and June 2019. Professional translation and back-translation of questions were carried out, and further adjustments were made based on feedback from interviewers and field testing with young people to ensure clarity and comprehension. Interviewers were proficient in local languages, trained in study procedures, confidentiality, and health matters, and matched to participants based on their gender. Interviewers administered the survey questions in a private, confidential location at or near the participant's home. The survey included a brief demographic interview with the head of each selected household and a comprehensive computer-assisted interview with the participant. Interviewers recorded responses on Android tablets, with questionnaires programmed into the tablets using Open Data Kit (ODK) software.

Measures

Dependent Variables

Mental distress was assessed by using the Kessler-6 psychological scale (K-6), consisting of six questions asking about depression and anxiety symptoms experienced in the past 30 days [16, 17]. Respondents rated the frequency of feeling (1) nervous, (2) hopeless, (3) restless, (4) extremely sad, (5) lacking effort, and (6) worthless on a 5-point Likert scale (0=none of the time to 4=all the time), yielding a score range of 0 to 24. Participants were categorized based on established cutoffs [16]: scores ranging from 0 to 4 are coded as *"0= no mental distress"* and scores from 5 to 24 are coded as *"1= with moderate/severe mental distress"*.

Suicide risk was assessed by asking the respondents: (1) Have you intentionally hurt yourself in any way? (2) Have you ever thought of killing yourself? (3) Have you ever tried to kill yourself? The original responses were categorized as "yes," "no," or "don't know/declined." These three items were summed up for a total score. If the respondents answered *"no"* to any of these items was coded as *"0 =no suicide risk"*, and if the respondents answered *'yes"* to any of these items was coded as *"1= with suicide risk"* (i.e., self-harm, suicide thoughts or suicide attempts).

Independent Variable

Digital sexual violence was assessed by asking the respondents whether any of these online incidents ever happened to them on the internet: (1) You received unwanted messages or links to X-rated websites, (2) You opened a link or message that shows naked people or people having sex, (3) You saw or received unsolicited sexual messages, images, or videos about someone you did not want to see, (4) You were asked any sexual information via the internet about how your body looks like without clothes when you did not want to, (5) You sent sexual information about yourself without clothes when you did not want to, (6) You were asked to talk about sexual acts on the internet when you did not want to, (7) You were asked by someone on the internet to do something sexual on the internet, (8) You were asked on the internet for a photo or video showing your private parts when you did not want to share, and (9) You did send someone a photo or video showing private parts when you did not want to. The response options for questions were: *"yes," "no"* and *"decline to*

answer." These items were summed up for a total score to distinguish between those who have experienced or never experienced any incident of violence. If the respondents answered ever experienced any of the incidences of online sexual violence, this was coded as "*1=yes" (digital sexual violence exposure)*, and if they never experienced any of these online incidences, How do we account for the decline to answer was coded as *"0=no" (no exposure to digital sexual violence)*.

Control Variables

Some of the important variables were added as control variables that includes age (0=13 – 17 years old, and 1=18-24 years old), highest education level completed (0=primary or less than primary, 1=secondary to grade 10, grade 11 or 12), and close relationship with friends (0=not at all, 1=not very much, 2=some, 3= a lot).

Statistical Analyses

All the descriptive characteristics of the participants, bivariate and multivariate, were stratified by gender during data analysis. All data were weighted, and survey weights were applied to yield nationally representative findings by accounting for the probability that each participant was included in the sample (base weight), the impact of survey response (nonresponse weight), and potentially imperfect sampling frames (post-stratification weight). Descriptive characteristics were utilized to obtain weighted descriptive characteristics of the participants across gender. Chi-square tests were used to show significant differences for bivariate, and weighted prevalence estimates were obtained using cross-tabulations across independent and dependent variables. Two multiple logistic regression models were utilized to predict significant associations between an independent variable (exposure to digital sexual violence) and outcome variables (mental distress and suicide risk) while controlling for potential confounders.

These data analyses produced odds ratios and 95% confidence intervals. SPSS version 29.0 was employed to perform all the statistical analyses, and the p-value was set at 0.05 in this study.

Ethical Considerations

The 2019 Namibia Violence Against Children and Youth Survey (VACS) strictly adhered to the guidelines set forth by the World Health Organization (WHO) to ensure the ethical treatment and safety of women who have experienced violence. The Research and Ethics Committee (REC) at the Ministry of Health and Social Services (MOHSS) and the CDC Institutional Review Board both independently reviewed and approved the survey protocol. This rigorous process aimed to safeguard the rights and well-being of the research participants. The University of Washington Institutional Review Board delegated its review authority to the CDC Institutional Review Board (IRB) specifically for the 2019 Namibia VACS. Throughout the study, strict protocols and training for interviewers were followed meticulously, with a primary focus on upholding safety, privacy, and confidentiality for children and youth who were involved in the survey. Moreover, the author of this manuscript obtained permission from the CDC to use the data, which was officially approved on April 28th, 2023. It is important to note that this study, being of a secondary nature, did not meet the regulatory criteria for human subject research. As a result, it was automatically exempted from further review by Lewis University, as per the guidelines established by the IRB.

Results

Participant Characteristics

Sample characteristics of the participants across gender are presented in Table 1. The average age of the participants across genders was 18.3 years old. About 62/980 (6.6%) boys and 392/4211 (9.4%) girls reported having been exposed to digital sexual violence. Among these

young individuals, 21% of the boys and 37.5% of the girls self-reported having moderate/severe mental distress in the past 30 days, while 11% of the boys and 18.1% of the girls reported being at risk of lifetime suicidal risk in Namibia.

Table 1. Descriptive Characteristics of the Participants Across Gender

Variables	Males (N=980)		Females (N=4211)	
	N	%	N	%
Age (m=18.3 years old)				
13 – 17	415	42.3	1777	42.2
18 - 24	565	57.7	2434	57.8
Highest level of education completed				
Primary or less than primary	189	30.8	589	21.6
Secondary to Grade 10	343	56.0	1756	64.4
Grade 11 or 12	81	13.2	383	14.0
Close relationship with friends				
Not at all	145	14.8	644	15.3
Not very much	169	17.2	953	22.6
Some	390	39.8	1616	38.4
A lot	276	28.2	998	23.7
Digital sexual violence exposure				
No	880	93.4	3798	90.6
Yes	62	6.6	392	9.4
Mental distress (past 30 days)				
No mental distress	773	79.0	2617	62.1
Moderate/severe mental distress	205	21.0	1572	37.5
Suicide risk (lifetime)				
No suicide risk	870	89.0	3440	81.9
With Suicide risk	107	11.0	760	18.1

M= the mean or average age of the participants was 18.3 year old across gender; N= weighted frequencies of the participants, % = Weighted percentages of the participants

The Prevalence of Digital Sexual Violence with Mental Distress and Suicide Risk

The prevalence results are presented in Table 2. For boys who were exposed to digital sexual violence, 64.5% reported moderate/severe mental distress in the past 30 days, compared to 18.1% who were not exposed to digital sexual violence. Out of the girls who were exposed to digital sexual violence, 65.2% reported moderate/severe mental distress in the past 30 days, compared to 34.8% who were not exposed to digital sexual violence. On the other hand, boys who were exposed to digital sexual violence reported lifetime suicide risk (27.4%) relative to those who were not exposed to digital sexual violence (10.0%). Similarly, girls who were exposed to digital sexual violence reported lifetime suicide risk (40.1%) compared to those who were not exposed to digital sexual violence (15.1%) in Namibia.

Table 2. The Prevalence of Exposure to Digital Sexual Violence with Mental Distress and Suicide Risk

Variable(s)	No Mental Distress (Past 30 days)	With mental distress (Past 30 days)	P value	No Suicide Risk (Lifetime)	With Suicide Risk (Lifetime)	P value
	N (%)	N (%)		N (%)	N (%)	
Males (n=980)						
Digital sexual violence						
No	721 (81.9)	159 (18.1)	<0.001	791 (90.0)	88 (10.0)	<0.001
Yes	22 (35.5)	40 (64.5)	-	45 (72.6)	17 (27.4)	-
Females (n=4211)						
Digital sexual violence						
No	2470 (65.2)	1317 (34.8)	<0.001	3194 (84.1)	603 (15.9)	<0.001
Yes	136 (34.8)	255 (65.2)	-	235 (59.9)	157 (40.1)	-

Chi-square (cross-tabulations) were used to obtain the significance, and prevalence estimates of the participants across gender; P-value of 0.05 was used to determine the significance

Logistic Regression Results Showing the Association Between Digital Sexual Violence with Mental Distress and Suicide Risk

Table 3 below presents logistic regression results stratified by gender. The results show that boys (AOR=10.16, 95% CI = 4.67-22.09) and girls (AOR = 3.66, 95% CI = 2.75-4.88) exposed to digital sexual violence were more likely to report moderate/severe mental distress in the past 30 days compared to those who were no exposed to digital sexual violence. At the same time, boys (AOR = 4.49, 95% CI = 2.16-10.63) and girls (AOR = 3.57, 95% CI = 2.68-4.75) who were exposed to digital sexual violence reported higher odds of lifetime suicide risk (i.e., self-harm, suicide thoughts, and suicide attempts) compared to those who were not exposed to digital sexual violence in Namibia.

Table 3. Association Between Digital Sexual Violence and Mental Distress and Suicide Risk

Variable(s)	Model 1		Model 2	
	Mental Distress (Past 30 days)		Suicide Risk (Lifetime)	
	AOR (95% CI)	P value	AOR (95% CI)	P value
Males				
Exposure to digital sexual violence				
No (ref.)	1.00	-	1.00	-
Yes	10.16 (4.67 – 22.09)	<0.001	4.79 (2.16 – 10.63)	<0.001
Females				
Exposure to digital sexual violence				
No (ref.)	1.00	-	1.00	-
Yes	3.66 (2.75 – 4.88)	<0.001	3.57 (2.68 – 4.75)	<0.001

Mental Distress was measured using Kessler 6 in the past 30 days. Control variables were age, highest level of education completed and close relationship with friends with friends, AOR = Adjusted Odds Ratios, CI = Confidence Interval at 95%, P value was set at = 0.05

Discussion

The primary purpose of this study was to examine the prevalence and association of exposure to digital sexual violence with mental health outcomes, specifically mental distress in the past 30 days and lifetime suicide risk (i.e., self-harm, suicide thoughts, and suicide attempts) for boys and girls aged 13 to 24 in Namibia. Utilizing nationally representative data, the research revealed that 6.6% of boys and 9.4% of the girls indicated that they had experienced digital sexual violence at some point in their lives. Recent findings, such as those by Srivastava [14], underscores exposure to digital sexual violence as one of the evident risk factors that can negatively impact the mental well-being of young people that includes severe psychological distress and an elevated likelihood of suicidal thoughts and behaviors.

Second, this study has shown a significant association between exposure to digital sexual violence and the risk of suicide (thoughts of suicide, suicide attempts, and self-harm) for both boys and girls. Similarly, suicide risk was 40.1% for girls and 27.4% for boys who were exposed to digital sexual violence. This is consistent with a prior study that found that both boys and girls who were threatened with the dissemination of sexually explicit content were at a higher risk of experiencing suicidal thoughts, planning suicide, attempting suicide, or engaging in non-suicidal self-injury [13]. Exposure to online sexual violence has the potential to trigger intense negative emotions, including anger, anxiety, depression, and emotional distress, which can, in turn, lead to the development of suicidal thoughts or the adoption of self-harming behaviors often used as coping mechanisms [9, 10, 13, 18]. Victims of digital sexual violence may also feel a profound loss of control over their lives, and sharing their personal information can trigger suicidal thoughts, self-harm, or suicide attempts to avoid shame and guilt surrounding their negative encounters.

Third, the present study indicated that exposure to digital sexual violence was also significantly associated with moderate or severe mental distress for both boys and girls. Specifically, the likelihood of experiencing moderate or severe mental distress was 10.2 times higher for boys (64.5%) and 3.7 times higher for girls (65.2%) who were exposed to digital sexual violence within the sampled population. These results align with prior research demonstrating the detrimental effects of exposure to explicit and non-consensual sexual content, online harassment, and exploitation which induces profound psychological trauma, internalized negative emotions such as fear, shame, guilt, helplessness and avoidance, which are responsible for intensifying their mental health challenges and other problematic behaviors [19]. Moreover, the intertwining of online sexual violence, cyberbullying, and harassment can create a pervasive and inescapable environment for victims, thus worsening mental health problems [11].

Implications for the Study

To mitigate the risk of suicide and mental distress for boys and girls in Namibia who may be victims of digital sexual violence, several interventions are recommended. First, it is crucial to implement comprehensive programs with a focus on enhancing digital literacy, fostering a safer online environment, promoting responsible internet usage, facilitating the identification, and reporting of online sexual violence [20, 21]. It is possible that these interventions could have the potential to reduce the occurrence of mental health issues for young people in Namibia. Second, there is a pressing need to bolster mental health literacy and establish accessible mental health counseling services, including nationwide crisis helplines and support systems. This approach would serve as an important step to support victims of digital sexual violence who may be grappling with thoughts of suicide and mental distress [22]. Finally, the early recognition of warning signs or symptoms associated with suicidality and mental distress, combined with efforts to enhance

mental health literacy through destigmatization, can effectively mitigate mental health issues and promote greater utilization of support services.

Limitations of the Study

There are several limitations in this study. The VACS data are cross-sectional; thus, establishing causal relationships was impossible. Social desirability could have impacted survey responses, recall biases, fears of disclosure, and the most recent experiences of digital sexual violence during the survey administration. This was mitigated by rigorous training of the interviewers on establishing rapport and building trust with participants while assessing sensitive information. The translated surveys were not validated, hindering the assessment of how well-validated scales from other contexts were performed in the study's languages (English, Afrikaans, Damara/Nama, Oshiwambo, Otjiherero, RuKwangali, and/or Silozi). Mental distress was measured only for the past 30 days, which further limited an understanding of how participants may have experienced mental distress immediately or months after a particular victimization experience. Nonfatal suicide attempts have been identified as the strongest predictor of death by suicide [23]. However, the lifetime measure of suicide risks lacks a clear temporal order, thus requiring a cautious interpretation of the findings in this study. The strength of this study was the use of a nationally representative sample, which serves as the first study to provide a comprehensive understanding of the impact of digital sexual violence on mental health outcomes (i.e., mental distress and suicide risk) for adolescents and young adults in Namibia.

Conclusion

Overall, this study has shown that exposure to digital sexual violence increases the risk of suicide behaviors and mental distress for boys and girls in Namibia. As such, this study underscores the urgent need to address the alarming impact of digital sexual violence on the mental well-being for both boys and girls in Namibia. To mitigate this risk, it is crucial to implement a multifaceted approach, including comprehensive digital literacy programs, promoting responsible internet usage, enhancing online safety measures, and facilitating the reporting of online sexual violence incidences. Additionally, providing mental health counseling, crisis hotlines, and robust social support services is essential. Through these concerted efforts, we can significantly reduce the prevalence of mental distress and suicidal tendencies among victims of digital sexual violence, fostering a safer and healthier digital environment in Namibia.

Conflicts of Interests

The author(s) declares no competing interests.

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Statistical Investigation of the Standard Height of Occlusal Rim Blocks among Patients Attending Makerere University Dental Hospital, Kampala, Uganda

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Abstract

Edentulous patients desire to reinstate oral function and aesthetics in the most comfortable state and to regain their self-esteem. Due to racial anatomic differences, there is a need to ascertain the standard height of Occlusal Rim Blocks (ORBs) for edentulous patients in Uganda. This study was aimed at statistical investigation of the standard height of ORBs among patients attending Makerere University Dental Hospital, Kampala, Uganda. This was a cross-sectional quantitative study that comprised 240 pairs of wax ORBs requested by clinicians for patients in need of complete dentures. Consecutive sampling was used to select the ORBs. The height of the anterior and posterior portions of the maxillary and mandibular ORBs were recorded using a pair of pliers and a flexible ruler, and data were entered into Excel and exported into STATA software version 15 for analysis. The mean height for the anterior portion of maxillary ORBs was 19.4 mm and for the posterior, 17.4 mm after adjustment while the mean height for the mandibular counterparts was 16.4 mm and 16.0 mm, respectively. There was a statistically significant difference between the mean height of ORB before and after adjustments and between the newly established and internationally accepted standard height of ORB. There was no significant sex difference in the mean height of ORBs. Overall, the mean height of ORBs for the Ugandan population was significantly shorter than the internationally accepted standard height.

Keywords: *Bite registration, Complete denture, Dental hospital, Edentulous patients, Height, Occlusal rim blocks.*

Introduction

Edentulism is a phenomenon that affects millions of people across the globe [1]. Oral diseases including dental caries and periodontal disease, as well as dental trauma, are the major causes of tooth loss, which impair masticatory function with the risk of developing nutritional problems and other health disorders [2, 3]. In Uganda, according to the World Health Organization (WHO) [4] the prevalence of severe periodontal disease in people aged 15 years and above is 19.2 %, untreated caries of permanent teeth in 5 years and above is 24.9 %, and edentulism in 20 years and above is 1.8 %.

Provision of Removable Complete Dentures (RCDs) is one way of restoring oral function. The fabrication of an RCD entails several steps which include diagnosis, treatment planning,

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impression taking and border molding, casting dental models and occlusal rim blocks, bite registration, selection and setting up of artificial teeth, denture processing, and insertion [5]. The main goal of fabricating RCD is to attain harmonious occlusion that is compatible with the stomatognathic system intended to bring back the patient's mastication, phonetics, esthetics, and improved social esteem [6].

Furthermore, an RCD has three surfaces (fitting, polished, and occlusal surfaces), which are designed at different construction stages [7]. Occlusal Rim Block (ORB), which is employed in the third stage of denture construction consists of a rigid and stable denture base and a rim made of a base plate wax.

It is used to establish the occlusal plane level, the arch form, and the jaw relationship both horizontally and vertically, i.e. bite registration [7].

In an effort to determine the height of teeth, McGrane [8] used casts poured from muco-static impressions and found that the distance from the mandibular incisal edge of unworn teeth to the labial mucosal fold next to the lower labial fraenum was 18 mm and for the maxillary counterpart 22 mm, giving a total of 40 mm when mounted together. While Yanikoglu [9] in Turkey, found that the mean distance from the depth of the maxillary mucobuccal/vestibule to the tip of the buccal tubercle of the maxillary and mandibular posterior teeth was 17.2 mm and 16.4 mm, respectively. Reports from Stananought and Newton [10] suggested 20 mm for the anterior upper jaw and 18 mm for the anterior lower jaw.

Already, Ellinger [11], through a radiographic study, found 20 mm for the anterior upper jaw and 16.3 mm for the anterior lower jaw. However, another work from Ellinger et al., [12] suggested that the height of ORBs should be 24 mm and 20 mm for the anterior upper and anterior lower jaw, respectively. Moreover, Johnson and Winstanley [13] and Johnson, Winstanley, and Wildgoose [14], found that the mean height of the anterior maxillary ORB was 18 mm and for the anterior mandibular counterpart was 14.3 mm. In a more recent study in Jordan, Marashdeh [7] reported 20.3 mm for the anterior upper jaw and 15.0 mm for the anterior lower jaw. Still, when he used students to fabricate the ORBs, he reported 19.8 mm for the anterior upper jaw and 16.4 mm for the anterior lower jaw.

Furthermore, in a study among the edentulous Indian population to determine the ORB height for the fabrication of removable complete dental prosthesis, More et al, [15] found that the height of maxillary anterior and posterior aspects when measured from the depth of sulcus (reference point) perpendicular to the ORB plane were 19-20 mm and 14 – 15 mm, respectively, while that of mandibular anterior and posterior aspects were 14 mm and 12-13 mm, respectively [15]. However, [16] emphasized that when fabricating the ORBs, the height of the maxillary anterior and posterior portions should be 22 mm and 18 mm, respectively, while that of the mandibular anterior and posterior portions should be 18 mm throughout from the depth of the sulcus.

The Uganda National Oral Health Policy [17] recommends the fabrication of complete dentures for the treatment of edentulous patients using the internationally accepted standard height of ORB of 22 mm for the maxilla and 18 mm for the mandible [18]. Despite recognizing the height of ORBs based on the internationally accepted standard in the fabrication of complete dentures in Uganda, there is a continued experience of challenges in adjusting them to fit the patients. The challenges include prolonged denture fabrication process, injury to the oral soft tissues, delayed chair side time, and so forth. In addition, there is no published study that has estimated the height of ORBs among the Ugandan population.

The purpose of this study was to statistically investigate the standard height of ORB among Ugandan edentulous patients attending Makerere University Dental Hospital, Kampala, Uganda.

Materials and Methods

Study Design

This was a cross-sectional quantitative study where data were collected through laboratory procedures.

Study Site

The study was conducted at Makerere University Dental Hospital in Kampala, the capital city of Uganda. The hospital is a teaching and health service delivery facility of Makerere University. It is the largest and adequately equipped dental facility employing the highest number of oral health workers in Uganda. It has a well-established prosthetic dental laboratory and offers specialized dental services including rehabilitation of edentulous patients with RCD to the patients including staff and students at the University, and other communities outside the University at a minimal fee. The hospital attends to approximately 660 outpatients per month of which about 20 are treated using RCD (Registry of Dental Records, 2022). The site was chosen because of the large number of edentulous patients (on average 20) who receive RCDs per month (Registry of Dental Lab Records, 2022), which could raise the required sample size.

Selection of Study Materials

Study materials comprised of pairs of wax ORBs routinely requested by clinicians for dental stone models of patients in need of RCDs. A consecutive sampling procedure was used to select a total of 240 pairs of ORBs (upper and lower arches). This was determined based on the hospital records where approximately 20 patients sought rehabilitation with RCDs per month, totaling 240 ORB pairs for the study period.

Inclusion Criteria

All ORBs with Free-Way Space (FWS) of 2 to 4 mm during the bite registration process.

Exclusion Criteria

ORBs of patients with flat alveolar ridges.

Data Collection Procedure

ORBs were fabricated in collaboration by a clinician and dental technologist in the dental clinic and dental laboratory, respectively. After obtaining administrative clearance from the Makerere University Dental Hospital, edentulous patients who came for complete denture treatment had clinical oral examination by the dental clinician. The clinician took the primary impressions of the patient's upper and lower arches and sent them to the dental technologist to cast them into dental stone to produce study models. The models were assessed to rule out flat alveolar ridges and used to fabricate a special/custom tray for the patient. The trays were used by the clinician to take secondary impressions of the patient's arches and sent to the dental technologist to fabricate the ORBs. The ORBs were sent to the clinician for bite registration of the patient with a free-way space of 2 to 4 mm. The measurements of the height of ORBs in mm were taken before and after bite registration by a trained and calibrated dental technologist as previously described [19, 20] using a pair of dividers (Kofa, China) and a ruler (Kofa, China). The values were recorded in a data abstraction form. Measurements for anterior height were taken from the deepest point of the facial sulcus adjacent to the labial fraenum (reference point) perpendicularly to the occlusal plane of the maxillary and mandibular ORB, respectively. While for the posterior height, measurements were done from the deepest point of the sulcus in the posterior region (reference point) perpendicularly, to the occlusal plane of the maxillary and mandibular ORB, respectively. These measurements from different ORBs were used to compute the mean height values (Table 2).

Quality Control

The clinical procedures were done by trained clinicians while the ORB measurements were done by a trained dental technologist. In order to minimize examiner variability, 1 trained and

calibrated dental technologist recorded the height of ORBs before and after bite registration.

Data Management and Analysis

The collected data were entered into an Excel spreadsheet from where they were exported into STATA software version 15 for data analysis to obtain the mean height of the occlusal rim blocks. Student's t-test was used to determine any significant differences in height of the occlusal rim blocks before and after bite registration, and compared to the internationally accepted standard. P-value< 0.05 was considered as a statistically significant difference in the measurements of the height of ORBs in millimeters.

Ethical Consideration

Ethical approval of the protocol was obtained from the Makerere University School of Health Sciences Research Ethics Committee (Reference Number: MAKSHSREC-2023-486) as well Uganda National Council for Science and Technology (Reference Number: HS3092ES). Permission to carry out the study was obtained from the administration of Makerere University Dental Hospital.

Written informed consent was obtained from all the participants who took part in the study. The purpose of the study was explained to the participants and their participation was voluntary. Their agreement to participate in the study did not waive their rights in any way and this was in accordance with the Helsinki Declaration [21]. All the data collected were kept securely in a cabinet under lock and key and only accessible to the investigator.

Results

Table 1. Demographic Characteristics of Respondents (N= 240)

Variable	Frequency	Percentage
Age (years)		
Mean	54 ± 9.3	
Range	28-78	
Sex		
Male	88	36.7%
Female	152	63.3%

The mean age of the patients who needed complete dentures was 54 (SD=9.3), range: 28-78 years. The majority were females (n=152, 63.3 %; Table 1).

Table 2. Mean Height of the Maxillary and Mandibular Occlusal Rim Blocks before and after Adjustments (n=240)

Maxillary arch	Anterior (Mean height in mm)	Posterior (mean height in mm)	P-value	CI
Before adjustment	21.6 ±1.2	19.3±1.2		21.43 – 21.74
After adjustment	19.4±1.5	17.4±1.5	<0.05	19.21 – 19.60
Mean difference	2.2	1.9		1.98 – 2.37
Mandibular arch				
Before adjustment	17.9±1.0	17.7±0.9		17.78 – 18.04
After adjustment	16.4±1.2	16.0±1.3	<0.05	16.23 – 16.55
Mean difference	1.5	1.7		1.37 – 1.66

The mean anterior height for maxillary occlusal rim blocks before and after adjustment was 21.6 mm and 19.4 mm, respectively, while the posterior mean height before and after adjustment was 19.3 mm and 17.4 mm, respectively (Table 2). The mean anterior height for mandibular rim blocks before and after adjustment was 17.9 mm and 16.4 mm, respectively. On the other hand, the mean posterior height for mandibular rim blocks before and after adjustment was 17.7 mm and 16.0 mm, respectively (Table 2).

In comparing the estimated height of ORBs before and after bite registration with the internationally accepted standard height, there was a significant difference for maxillary and mandibular jaws (p-value < 0.05), (Table 2).

Table 3. The Mean Height of Maxillary and Mandibular Occlusal Rim Blocks before and after Adjustment for Male and Female Participants (n=240)

Variable	**Maxillary occlusal rim block**			
	Anterior height (mm)		**Posterior height (mm)**	
Sex	Before	After	Before	After
Male (n=88)	21.5	19.3	19.4	17.3
Female (n=152)	21.6	19.4	19.3	17.4
Mandibular occlusal rim block				
-	**Anterior height (mm)**		**Posterior height (mm)**	
Sex	Before	After	Before	After
Male (n=88)	19.8	16.5	17.6	16.0
Female (n=152)	19.7	16.4	17.7	16.1

The general difference in the height of ORBs between the male and female participants within the maxillary and mandibular jaws in the anterior and posterior portions before and after adjustment was 0.1 mm. There was no significant difference between the mean height of maxillary and mandibular ORB before and after adjustment among the male and female participants (p>0.05, Table 3).

Table 4. The Mean Height of the Maxillary and Mandibular Occlusal rim Blocks after Adjustment in the Present Study and from Different Studies

Author(s)	**Sample size**	**Country**	**Maxillary (in mm)**		**Mandibular (in mm)**	
			Anterior	**Posterior**	**Anterior**	**Posterior**
Internationally accepted height Driscoll & Glen [16]	-	USA	22	18	18	18
More [15]	200	India	19-20	14 – 15	14	12-13
McGraine [8]	-	USA	22	-	18	-
Yanikoglu [9]	45	Turkey	-	17.22	-	16.42
Ellinger [11]	50	USA	20	-	16.3	-
Stananought [10]		UK	20	-	18	-
Johnson & Winstanley [13,14]	414	UK	18	-	14.3	-

Marashdeh [7]	(300)	Jordan	-		-	-
(Students)	150		19.8		16.4	
(Technicians)	150		20.3		15.0	
Wood & Johnson [19]	-	UK	22	-	18	18
Wood [20]	-	UK	22	-	18	18
Bishop & Johnson [27]	-	UK	20	-	16	-
Nallaswamy [28]	-	UK	22	-	18	18
Zarb [29]	-	USA	22	-	18	18
Rangarajan [31]	-	India	22	-	18	18
Present study	240	Uganda	19.4	17.4	16.4	16.0

USA, United States of America; UK, United Kingdom

Discussion

To our knowledge, there is no published information regarding the determined height of ORBs for Ugandan edentulous patients. The present study established the baseline data of the estimated standard height of ORBs using a method previously described [8]. The present findings will inform policymakers in reviewing existing guidelines [17] in fabricating ORBs that are suitable for Ugandan edentulous patients. The implication of the present findings is that there will be saving of resources in terms of materials and chair side time in adjusting ORBs during the bite registration visits.

In the present study, the mean age of the patients was 54 years which is like the reported age by [22] in Istanbul, Turkey. However, Miranda et al. [24] reported a higher mean age of 69 years. Globally [2] including Uganda [23] dental caries is one of the causes of edentulism and being a cumulative disease could partly explain the age of the participants.

In the present study, most of the respondents were females which supports findings in other studies [12, 22-24]. Apart from females being more affected by caries [23], hence edentulism, Kršek and Dulčić [25] indicated that complete dentures offer good restoration of appearance, correction of speech defects/phonetics, restoration of masticatory efficiency and occlusion, which are all cherished by females compared to males. In contrast, Bekiroglu et al. [22] and Oweis et al. [26] reported a higher prevalence of males with RCDs compared to females, the reason for the observed difference is not readily obvious.

Mean Height of Maxillary and Mandibular Occlusal Rim Blocks

The present study showed a significant mean height difference before and after adjustment in the maxillary anterior and posterior portions by at least 1.9 mm and then 1.5 mm for mandibular ORBs (Table 2) to achieve a 2-4 mm freeway space. This is in support of the findings from earlier studies [13,14]. This implies that the technologists were following the international guidelines [18] adopted in Uganda [17] for the fabrication of complete dentures. These findings are comparable to reports from McGrane [8] whose measurements from the same reference points were 22 mm and 18 mm for anterior maxillary and mandibular ORBs, respectively. Furthermore, [13] reported slightly lower values for the maxillary ORBs before bite registration of 21.4 mm and 17.6 mm for mandibular. Earlier, [16] had emphasized that when fabricating the ORBs, the height of the maxillary anterior and posterior ORB should be 22 mm and 18 mm respectively while that of mandibular anterior and posterior ORB should be 18 mm throughout from the depth of the vestibule/sulcus [16].

It could be argued that most of the technologists are following the international guidelines [8, 14, 27] for the fabrication of ORBs, and therefore, measurements before bite registration are adhered to. However, it has been reported that some experienced technologists fabricate ORBs with reduced heights compared to the international guidelines [7]. This could be aimed at easing the bite registration process and more accurately fitting removable complete dentures.

During bite registration, in the present study, clinicians reduced the anterior and posterior portions of the maxillary ORBs by 2.2 and 1.9 mm respectively, as well as 1.5 and 1.7 mm for the respective counterparts of the mandibular ORBs (Table 2). Other studies [27,13,7] reported higher values of height reduction of 4 and 3-4 mm from the internationally accepted standard heights of maxillary and mandibular ORBs compared to the present study. It is noteworthy that reducing the height of ORBs during bite registration to achieve a standard freeway space of 2-4 mm could lead to a waste of time and materials.

More et al [15] found that the anterior height of maxillary ORB was like the findings of the present study but recorded lower values of posterior height of the maxillary and both anterior and posterior height of the mandibular ORB (Table 4).

The sex difference in the ORBs' mean height between the respective anterior and posterior portions of the maxillary and mandibular jaws before and after adjustment was 0.1 mm.

Implications for Clinical Practice

The findings of the present study among the Ugandan population will set the center stage for improved rehabilitation of edentulous patients. This will save time and resources during the registration stage and help to improve the accuracy of the removable complete dentures. Furthermore, the findings will be used to review the training curriculum of dental surgery and dental technology students.

Implications for Future Research

Prospective scholars should consider conducting studies involving participants from several dental hospitals for better generalizability of the study results. In addition, follow-up studies to evaluate patient and health provider satisfaction with the use of removable complete dentures based on different heights of ORBs are recommended.

Limitations of the Study

The bite registration of ORBs has an inherent input of the patient, which is outside the control of the clinician. This was a cross-sectional study in nature and thus not able to identify the causality of the outcome of interest. The study conclusions should be drawn with caution because the study was conducted in only one dental hospital so the results may not be generalized to the entire Ugandan population.

Recommendations

The present study recommends Ministry of Health to review the Uganda National Oral Health Policy guidelines in line with the newly established height of occlusal rim blocks. The training curriculum of dental surgery and dental technology students' needs to be reviewed in consideration of the established height of ORBs.

Conclusion

Overall, the mean height of Occlusal Rim Blocks (ORBs) for the Ugandan population was significantly lower compared to the internationally accepted standard. The mean height for the anterior portion of maxillary ORBs was 19.4 mm and for the posterior, 17.4 mm after adjustment while the mean height for the mandibular counterparts was 16.4 mm and 16.0 mm, respectively.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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Author's Contributions

DN, IO, EM, and CMR participated in the conception, study design, data analysis, and manuscript preparation. DN and GB participated in data collection. All authors read and approved the final manuscript.

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Management of Public Sector Employee Engagement During the COVID-19 Era: Implications for Policies, Practices and Training Needs

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Abstract

Due to the COVID-19 pandemic in 2019/2020, employees worldwide started the working from home (WFH) job pattern which required public sector organizational leaders to deal with problems arising from management of remote working staffs that were overwhelmed with trying to place a dividing line between their jobs and place of residence alongside learning new skills. This study is a descriptive, analytical, and explanatory cross-sectional survey utilizing both qualitative and quantitative data to determine the policies and processes that existed in State public sector organizations for the management of employees during an emergency such as COVID-19 that required remote working as well as their training requirements. Fifty-four public sector organizations participated in the study. Data collected from 54 in-depth interviews of organizational heads and questionnaire administered to 50 human resource managers revealed that availability of WFH policies and guidelines is significantly associated with self-confidence to engage employees remotely. Factors like availability of resources, ICT proficiency, flexibility, work-life balance, virtual platforms, and project management tools proficiencies influence effectiveness of engaging remote work in the public sector. This study revealed that 64% of public sector administrators require additional trainings for effective staff engagement. When organizational executives and HR managers successfully practice employee engagement, staff are enabled to create personal schedules that balance their jobs and lifestyle in the novel post-COVID-19 WFH realities. Such practices are likewise advantageous to organizations as staffs WFH would experience improved health and productivity thus lessening expenses associated with absenteeism and staff turnovers as well as augmenting corporate advancements.

Keywords*: Employee Engagement, SHRM Policies, WFH, COVID-19.*

Introduction

The topical global coronavirus (COVID-19) pandemic which started in 2019 in China led to extreme economic recession where every country enforced complete lockdown, prohibition of unimportant travels likewise shutdown of businesses. These stringent controls resulted in problematic working situations and challenges with conventional modes of work which led numerous organizations to decide on flexible working procedures and implementation of the 'working from home' (WFH) pattern in order to lessen the spreading of the virus and financial loss. Thus, the COVID-19 crisis speedily promoted the WFH which even post-COVID-19 has now become the 'new normal' way of work. Nevertheless, the WFH system came with its own accompanying consequences such as employees' deficient virtual working skills, inadequate communication aptitudes as well as information, communication, and

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technology (ICT) difficulties. Managers and human resource (HR) professionals were abruptly faced with managing their subordinates without the necessary skills for managing the activities and performances of virtual, remote working staff. Virtual networking was problematic which resulted in mental apprehension and trauma as face-to-face dialogue and social interactions were limited. Family lives were disrupted as employees struggled to achieve a healthy work-life balance leading to family conflicts. Similarly, the lack of space specially dedicated to office work was difficult to carve out in homes alongside the issues of storage and ensuring confidentiality of official information. Upholding and maintaining organizational culture were equally difficult with remote working [1-3].

The above-listed remote work issues all had strategic human resource management (SHRM) implications for HR departments as managers and HR professionals had to devise inventive managerial techniques (policies and procedures) that were temporarily operative for improving staff flexible working whilst striving to efficiently manage the WFH impacts. The COVID-19 catastrophe forced human resource practitioners to reconsider likewise refine their job description in order to adjust to contemporary working modes. Similarly, the current post-COVID-19 period necessitates the formulation of long-term strategies for managing remote working employees as this work pattern has come to stay [1, 4]. Although the prolonged effects of COVID-19 remain unidentified, it is assumed that potential chances of such crisis occurrence are high and certain. As such, organizational management and human resource professionals must think ahead in view of the fresh realities of working from home in order to device meaningful ways of ensuring employee engagements and wellness [5].

Human resource management in public sector organizations is more challenging due to the fact that public sector organizational structures are known to be highly changeable and their resources highly limited, thus requiring added specific strategic HRM engagement approaches, both administratively and politically [6,7]. Employee engagement denotes the degree to which workers are passionate and committed to their jobs. An employee who engages positively with an organization works hard to enable the achievement of organizational tasks likewise promotes strategic goals which can lead to enhanced productivity as well as a flourished well-being. Employee engagement became an extremely key priority during the COVID-19 lockdown which led to managers and human resource professionals continually devising inventive and efficient ways of engaging their employees throughout that critical period [8, 9].

This article presents the results of a primary research conducted among public sector employees to appraise the SHRM provisions in place during the COVID-19 period for facilitating working from home as well as the employee engagement processes initiated by public sector administrators during that period, with the aim of determining gaps and recommending best practices for management of public sector remote workers.

This study conducted a situational analysis of remote-working resultant from COVID-19 in Nigerian Public Sector Organizations towards determining the SHRM competencies of public sector executives and human resource (HR) managers for managing virtual remote workers.

The specific objectives of undertaking this study are to:

1. Analyse the SHRM philosophies of public sector organizations regarding management of its remote working human capital.
2. Evaluate the public sector organisational processes of SHRM in place towards managing remote working staffs.
3. Appraise public sector organisational SHRM programmes in place towards managing remote working staffs.
4. Establish current SHRM training and development practices for public sector executives regarding remote working.

5. Determine the factors that influence virtual remote-working at the public sector organizational level.

Research Questions

1. What are the HRM philosophies of public sector organizations regarding management of its remote working human capital?
2. What are public sector organizational HRM processes in place towards managing remote working staffs?
3. What are public sector organizational HRM programmes in place towards managing remote working staffs?
4. What are the current SHRM training and development practices for public sector executives and HR managers regarding remote working management?
5. What are the factors that influence virtual remote-working in the public sector?

The main variables in this study are independent environmental variables such as social, institutional, and political factors while the dependent variable is SHRM implementation of virtual remote working human capital development in the public sector organizations.

Review of Literatures

Human resource management (HRM) is recognized to be amongst the extremely dynamic aspects of competitive advantage as it utilizes inimitable organizational resources for generating profits and achieving corporate goals. Human resources are claimed to be a beneficial capital due to their ability to provide viable productiveness in the corporate world and engaging them positively via procedures such as providing incentives, skill enhancement, and learning opportunities can inspire long-term employments [10, 11]. Strategic human resource management (SHRM), which is a further definite mode of persons management developed from the conventional HRM speciality, is defined as a sequence of human resource actions and arrangements intended for achieving organizational goals and objectives. SHRM links HR to strategic aims and purposes to enhance employee performances, nurture inventiveness, likewise advance corporate culture, and accomplishments. Utilizing SHRM techniques tremendously improves vital fiscal and non-fiscal organizational achievements [12, 13]. Topmost identified SHRM actions comprise having: an efficient communication network, collaborative work design, flexible labour force, quality improvement procedures, staff enablement as well as developing of capacity [14, 10].

COVID-19 pandemic produced a highly challenged work setting for human resource professionals and managers to handle since they were required to swiftly step into unfamiliar terrain of remote working without any warning and took on the responsibility of aiding employees to adjust to new work policies and procedures [15]. Numerous applied instances highlight the ways that human resource managers developed tactics meant for overcoming the COVID-19 pandemic drawbacks. Such approaches include innovative online training contents and procedure; improvement of employee digital aptitudes; motivational maintenance means likewise reduction of emotional trauma. It is expected that these measures improved the performances and capability of staff for long-term supporting of organisational achievements as the WFH pattern has come to stay post-COVID-19 [16, 17]. With the COVID-19 pandemic disrupting worldwide economic activities likewise commercial ventures and service organizations in 2019/2020, human resources management became a core activity. Now that the world is recovering from the aftermath of the catastrophe, SHRM is further critical to organizational salvage and progress as adaptation to new ways of working and flexibility in job environments is crucial for the contemporary labour force [18].

The public sector denotes organizations possessed by, likewise funded via governmental means, whose key stakeholders comprises legislators and the general populace. The main

aim of such entities is creation of value for residential populations. The public sector constitutes the principal employer of workforces in majority of countries and are saddled with providing vital significant services (for instance, educational, healthcare, housing, transports, etc). However, experiential evidence demonstrates that implementing general SHRM techniques is not suitable in public sector organizations as a result of diverseness of services kinds offered likewise workforce multiplicity and equally accountability of civic spendings [19, 20]. Public sector executives and managers stated some worries and averseness about remote working during the COVID-19 pandemic. The Society for Human Resource Management [21] demonstrated that this arose from the great challenges experienced in monitoring and oversight of subordinates as WFH disallows direct or side-by-side interactions and overseeing. WFH equally confronted public sector management with sporadic manager-employee communication alongside guidance and incentive challenges [22].

Employee Engagement

Contemporary organizations and human resource managers regularly devise creative and resourceful ways of engaging employees WFH, particularly during critical periods such as that of the COVID-19 pandemic and also post-COVID-19. Employee engagement refers to a job-related attribute which ensures that every organizational staff offers excellent services and is dedicated to organizational objectives and culture. WFH made managerial directing and reaching decisions challenging which resulted in difficulties in staff engagement. Employee engagement inspires enthusiastic physical, emotional likewise intellectual passion, and spirited devotion aimed at achieving organizational and personal goals likewise productivity. Furthermore, it forecasts wellness, improved lifestyle contentment, and retaining of staff as well as lessened turnover intents [23, 24, 25]. A methodical literature review conducted by [26] revealed that providing psychological attention and flexibility are the highly chosen strategies for enhancing employee engagement. Similarly, developing competencies, showing empathy as well as guiding expectancies aided work engagement.

The corporate arena has changed post-COVID-19 and with WFH becoming the new normal, HR professionals are required to continually evolve inventive, imaginative likewise efficient means of engaging employees for improved performances. For employee engagement to be successful, the following characteristics must be exhibited by organizational executives and HR managers: transformational leadership and innovativeness; emotional intelligence; understanding reasons behind work-family conflicts, improving autonomy as well as required skills; corporate social responsibility (CSR) actions; a sense of self-worth, job crafting, confidence; teamwork; flexibility; positivity; commitment to staffs security and psycho-social plus physical wellness; and good rapport between management and employees [27, 28, 29]. Personnel engagement is facilitated by observed management support, high-quality interior communication, and technological investments likewise HR advancement strategies such as training prospects, professional growth chances, and enhanced performance evaluation [30, 31].

Remote Working Policies and Practices in Employee Engagement

Human resource practitioners have acknowledged difficulties with engaging staffs, and studies reveal that limited workforce engagement can lead to disinterest in present job positions or fear about job loss on the part of the staffs. Furthermore, fulfilment at work have been positively linked to employee engagement [32, 33]. Management is crucial throughout critical periods and organizational executives must be highly visible during such periods and afterwards, to instil trust in employees and

adequately engage them. Due to the adverse effects of WFH on psychological well-being, mental health facilities alongside supplementary compensation benefits as well as a reasonable, harmonized salary structure can be provided to promote employee engagement and motivation during tough times [26, 34].

Policies recommended for the achievement of enhanced staff engagement, and effective performance especially during challenging periods that require WFH are:

1. Concentrate on fundamental ethics and values.
2. Be clearly supportive of employees.
3. Request for staffs' feedback and sharing of information.
4. Open and honest communication between organizational management and staffs
5. Commitment to staffs' wellbeing and engagement [35, 36].

Contemporary organizations are required to stay vigilant likewise adapt quickly to unpredicted crises such as the COVID-19 pandemic that created heightened uncertainties within global labour forces, posing great and instantaneous perils to states and international economies. This necessitates managers and human resource professionals to discover fresh solutions for navigating the changed work settings of working from home (WFH) and helping employees to adjust and be engaged in the new job environment. [37] enumerated the following as signs of deficient employee engagement: disenchantment and indifference with work; monotony; negligence; wastefulness; non-accountability; diminished viability and outputs; increased absence from work; amplified staff resignation; unresolved challenges and delayed or sluggish organizational accomplishments regardless of huge fiscal and capital investments.

According to [38], remote working delivers several advantages for organizations and staff; however, studies have also shown that work performances decline, job contentment reduction likewise household-linked difficulties ensue with striving to achieve a balance in management of work-life borderline. Consequently, these authors designed a management-based schematic representation called the 'Assess-Create-Support Framework' **(See Figure 1)** that offers administrators practical guides for efficiently addressing their staff's work-life balance boundaries demands and likewise resolve difficulties encountered when working from home. This schema is intended to assist organizational executives and HR practitioners with the management of psycho-social tensions that arise from WFH and enable creation of a more structured daily schedule both throughout and post-COVID-19 pandemic.

Studies have suggested that due to the extensive likewise manifold managerial tasks executed by organizational executives and HR managers, there might be a case of inadequate consciousness about employee work-life balancing demands on their part and thus offer assistance based on personal experiences. Thus, administrators can use this framework to implement practices that deliver objective conciliation amongst their staffs' varied work-home border choices as WFH practices should be continually and creatively adjusted to enhance outcomes that guarantee the heightened wellness of all staffs [39, 40]. Successful organizational policies meant to boost employee wellness are contingent upon 2 main aspects: the extent of management as decision-makers and protectors being able to execute their policies; and the extent of policy execution meeting staffs' demands. The 'Assess-Create-Support' framework aims to address these two aspects. Through the application of the Assess-Create-Support Framework, organizational executives and managers could promote WFH guidelines and strategies to permit their collaborating with staffs for establishing personalized psychologic likewise time-bound limits thus providing staffs with combined arrangements and flexible workings required for enhanced job and household performances [41, 42].

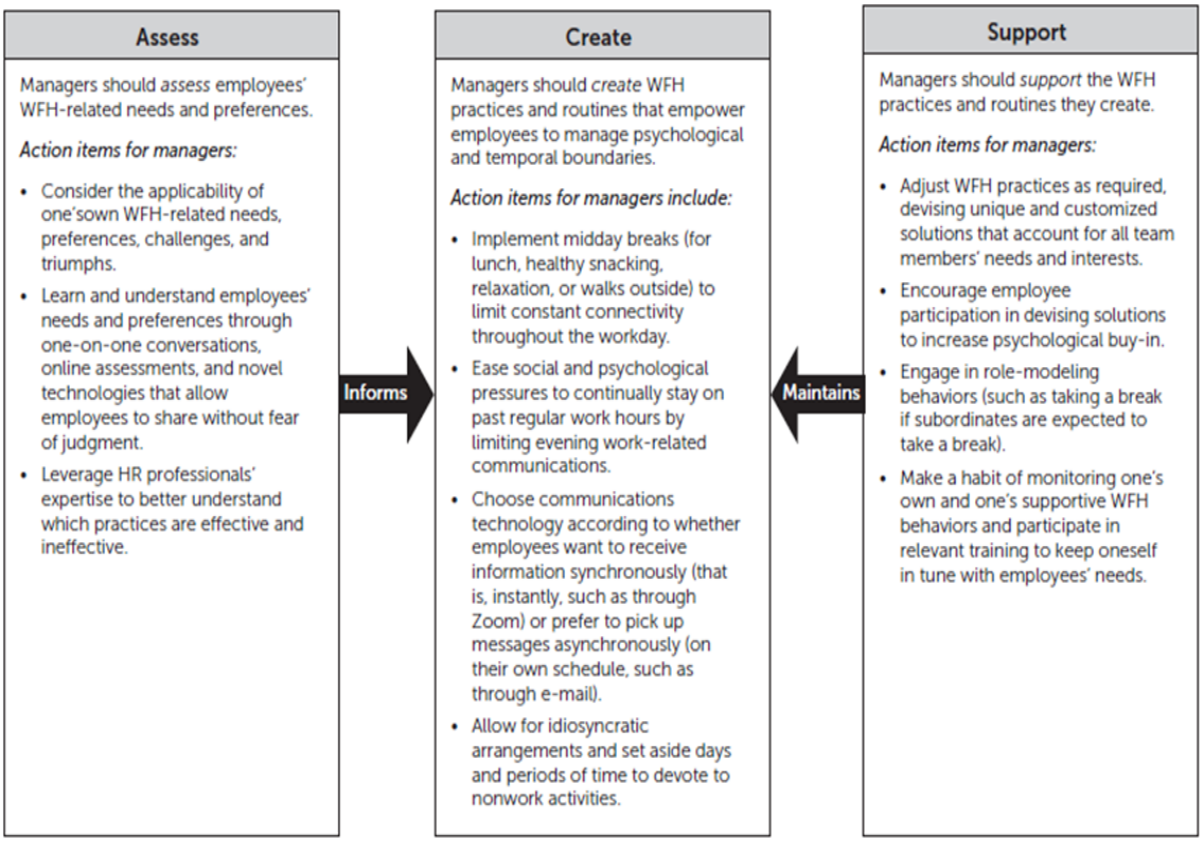

Figure 1. The WFH Assess-Create-Support Schema. Source: [38].

Study Relevance

The COVID-19 pandemic gave public executives and managers unparalleled problems as to how to safeguard employee wellbeing and guarantee their engagement alongside provision of civic facilities. Even though public sector human resource management is vital in ordinary circumstances, it is especially demanding in periods of crisis such as occurred during the coronavirus pandemic and in case of future unforeseen global emergencies. Such situations require administrators to devise strategic policies and processes for protecting staff wellbeing as well as complying with fresh regulations [43, 44].

In Nigeria, the public sector consists of Ministries, Departments and Agencies (MDAs), and has the responsibility and role of executing governmental policies and programs. The public sector management have to develop tactics that resourcefully and effectively direct MDAs, generate political backing, maintain organizational competences likewise integrity, and source for required funds. Efficiency within the public sector in Nigeria relies upon successful staffs' engagement and leadership without which there will be heightened staff turnover as well as diminished efficacy and organizational outputs. Hence, awareness about engagement of public sector workers is highly relevant to determine limitations and recommend to executives and HR managers policies and best practices that can successfully enhance enthusiasm, productiveness and retaining of employees [45]. Matters or problems affecting government's capability of providing amenities or facilities demand added investigation [44]. Consequently, this study explored public sector executives and human resource managers' experiences and problems alongside impediments associated with implementing SHRM processes and policies during the COVID-19 pandemic. Conducting experiential studies about organizational engagements of their employees during disasters

such as the COVID-19 pandemic is highly relevant since a thirty-eight percent chance of such occurrence has been projected during an individual's life. Studies have also projected that approximately 3 times multiplication of overwhelming epidemics will develop every year during the next ten years. Consequently, determining and analyzing such data can support staff engagement ingenuities during comparable crisis. Furthermore, such discoveries can facilitate best HR practices in the current, novel WFH pattern to enable maintenance of employee engagement at an advanced degree that could lead to augmented dedication, wellness likewise enhanced organizational achievements [46, 47, 48, 49]. Results from this study is intended to furnish the public sector management with knowledge on how to deal with employee engagement and management in the post-COVID-19 era which has the working from home (WFH) pattern as the "new normal" way of working, and in the event of unpredictable future catastrophes.

Methods and Procedures

Sampling Frame

This comprises the whole executives and human resource directors/managers of the state-level public sector ministries, departments, agencies (MDAs) and parastatals in Osun State, Nigeria. The state public sector secretariat is located in Osogbo and consists of 25 ministries/departments, and 29 agencies (MDAs) and parastatals. The sample were the executives and management employees chosen from the 54 public sector organizations in the State [50].

Research Design

The research is a population survey with a mixed-method design blending both quantitative and qualitative research. It is a descriptive, analytical, and explanatory cross sectional survey intended to provide answers to the research questions.

Research Technique

The research procedures for this research were:

Questionnaire: This technique entails asking survey participants to individually answer an identical collection of questions in a predetermined fashion. The copies of questionnaire were administered to 50 available HR managers in the public sector.

Semi-structured interview: This involves interviewing survey participants guided by pre-set questions. Fifty-four MDA and parastatals executive were interviewed for this study.

Results

This section will present responses from public sector organizational executives and HR managers on management and engagement of employees during the COVID-19 pandemic as well as their general viewpoints about remote working in their various work departments. These will be thematically analysed under the following sub-headings: SHRM philosophies of remote working in the public sector; Availability and knowledge of WFH policies in the public sector; Factors influencing employee engagement remote work practices; Employee engagement challenges during COVID-19 pandemic; Skill gaps; and Training needs**.**

A. SHRM Philosophies of Remote Working in the Public Sector

Remote working is strategically viewed as being advantageous by the studied public sector organizations for the following reasons: flexible work hours, improved performance, customized work environment, improved employee retention rates as well as better physical and mental health. However, disadvantages mentioned include miscommunications, limited access to networking events, data security and privacy issues, lack of connection with colleagues and isolation leading to lowered morale, hindering development of innovative solutions, difficulty in onboarding new employees, and blurred work-life boundaries.

B. Availability and Knowledge of WFH Policies in the Public Sector

Questionnaire administered during the survey revealed information about knowledge on availability of COVID-19 workplace policies and guideline documents in public sector organizations as well as their review by public sector executives and HR managers. Findings demonstrated that nineteen (38%) respondents know of the policy document existence while the same number have read the guidelines on remote working. However, only 16 respondents (32%) have the self-confidence to implement its content.

Table 1. Availability and Review of Policy and Guideline on Remote/Hybrid Working

Availability of Remote/Hybrid Working Policy or Guidelines			**Read and Reviewed Policy and Guidelines on Remote/Hybrid Working**			**Perception of Self-confidence to Work Effectively from Home**		
Availability	**Frequency**	**%**	**Availability**	**Frequency**	**%**	**Response**	**Frequency**	**%**
Yes	19	38	Yes	19	38	**Yes**	16	32
No	23	46	No	31	62	**No**	11	22
Not Sure	8	16				**Not Sure**	23	46
Total	50	100	Total	50	100	**Total**	50	100

Source: Authors' Field Survey, 2023

For public sector organizational management to effectively engage remote workers, they must read the policy documents and be self-confident about implementing the contents. This study revealed a significant association ($p < 0.05$) between review of WFH policies and guidelines and gender of respondents (See Table 2).

Table 2. Association Between Review of WFH Policies and Gender

Read/reviewed MDAs policy and guidelines on remote/hybrid work		**Value**	**df**	**Asymp. Sig (2-sided)**
Female	Pearson chi square	20.773	4	0.000
	Likelihood ratio	13.935	4	0.008
	Linear by linear association	9.823	1	0.002
	N or valid cases	19		
Male	Pearson chi square	8.873	4	0.064
	Likelihood ratio	8.348	4	0.080
	Linear by linear association	0.129	1	0.720
	N or valid cases	31		
Total	Pearson chi square	31.990	4	0.000
	Likelihood ratio	35.110	4	0.000
	Linear by linear association	20.448	1	0.000
	N or valid cases	50		

Source: Authors' Field Survey, 2023.

C. Factors Influencing Employee Engagement Remote Work Practices

Responses from the in-depth interview responses regarding factors that influenced engagement of remote workers during the COVID-19 pandemic include: Effective communication; Access to resources; Flexible work hours; Regular feedback; Goal Alignment; Leadership; Trust; Clear expectations: Collaborative culture; Training and support; Work-life balance support; Emphasis on Results;

and Recognition and appreciation. Regarding resources needed for successful remote working, the questionnaire respondents mentioned the following: Technological tools training (80%); Laptop/Desktop provision (66%); Internet connectivity (66%); Technical support for teleconferencing apps installation on computers and smartphones (72%); Flexible work hours/days (60%); Ergonomic work chairs and tables (74%); Money to supplement electricity/fuel cost (72%); and additional fund for phone calls, messaging and internet bundles (72%).

D. Employee Engagement Challenges During COVID-19 Pandemic

The in-depth interview respondents stated communication breakdown, employee isolation (leading to decreased morale), mental health issues/concerns, lack of access to necessary resources/equipment, technology or technical challenges, changing regulations and policies, employees' difficulties separating work from personal life and less effectiveness of remote onboarding and training programmes as the major issues encountered with engaging employees during the COVID-19 pandemic. Fifty-eight percent (58%) of questionnaire-administered participants lack the necessary equipment and ICT tools for engaging WFH staffs successfully.

E. Skill Gaps

According to the organizational executives interviewed, the following deficient competencies were required for effective management and engagement of remote workers during the COVID-19 pandemic: Cultural competency, Team Building, Training and Development Skills, Result-Oriented Leadership, Technical/ Technological Proficiency, and Time Management Skills.

F. Post COVID-19 Training Needs

Sixty-four percent of the public sector administrators and HR managers require added trainings for effective staff engagement. Comprehensive trainings in the ensuing areas is essential, amongst others: Cybersecurity awareness/best practices; Digital literacy/proficiency, Proficiency in communication tools usage; Change management and Adaptability strategies; Recognizing stress, burnout and mental health issues and wellbeing support competency; Team building; Employee engagement; Inclusive leadership; Remote work policies, legalities, obligations and compliance standards; Effective written and verbal communication skills; Technology proficiency; Specialized training on fair and effective performance evaluation for remote employees; and Proficiency in virtual collaborative platforms.

Discussion

Applied data credibly reveals SHRM supplementary worth in enhancing organizational efficiencies resulting in improved outputs, increased viability, and managerial legacy. Preliminary results from public sector investigations also indicate that SHRM influences employee impetus likewise organizational achievement positively. Nevertheless, SHRM studies have mostly focused and depended on private sectors statistics [19]. Hence, this study intended to amend the disparity through viewing SHRM within the public sector perspective.

SHRM Philosophies of Remote Working in the Public Sector

Investigations by [38] highlighted the positive effects of WFH. However, [1] and [26] summarized the negative consequences of WFH. These studies all corroborate our findings on philosophies about public sector remote work.

Availability and Knowledge of WFH Policies in the Public Sector

Our study revealed the existence of remote working policies in the public sector during the COVID-19 pandemic. However, [52] recommends redesigning of long-term policies that inspire civic workers to engage with

organizational goals since current designs of traditional staff support systems could prove unproductive with the current WFH pattern.

Factors Influencing Employee Engagement Remote Work Practices

According to [8, 9, 31], Staff engagement is enabled via a supportive management team, flexibility, enhanced interior communication, and technology as well as SHRM improvement approaches like trainings, wellbeing prospects, and improved performance evaluation. Our findings revealed these factors too alongside others like access to resources, emphasis on results, and recognizing the efforts of remote workers.

Skill Gaps

During the COVID-19 pandemic, administrators and human resource (HR) professionals were faced with managing their subordinates without the necessary skills such as ICT proficiency, virtual collaboration aptitudes, and communication skills required to engage virtual, remote working staff [1, 4]. Our study was able to identify those skill gaps which are highly significant in view of the 'new normal' WFH pattern.

Employee Engagement Challenges During COVID-19 Pandemic

The COVID-19 pandemic generated a highly difficult work situation for engagement of the workforce by human resource professionals and managers [15, 43] as likewise mentioned by our research participants who were required to swiftly step into unfamiliar terrain of remote working without any notice.

Training Needs

In view of the ever-emerging global crisis and emergencies, investigative data from a United States survey have suggested that public sectors HR practitioners comprehend how to engage employees during critical periods via SHRM activities like trainings and professional development likewise adaptation and salvaging strategies [44]. Consequently, our study identified numerous post-COVID-19 training requirements of public sector organizational leaders and HR managers for whom adequate trainings programmes can result in high effectiveness likewise efficient public service.

Conclusion and Recommendations

According to [51], HR professionals are necessitated to review organizational employee engagement approaches from a fresh viewpoint for ensuring that staffs are kept inspired post-COVID-19 pandemic. SHRM strategies alongside corporate culture should be incorporated into post-COVID-19 employee engagement [1]. Engaging employees ought to be supplemented via providing opportunities' possibilities likewise creating favourable settings that enable the expression of flairs, ingenuities, originalities likewise freshly possessed experiences, information, and proficiencies [45]. The concepts behind the [53] person-environment (P-E) fit model should also be considered as employees continue to work remotely post-COVID-19. This model highlights the importance of making sure that individuals have the right attributes that can enable them to WFH efficiently as remote working may not be suitable for all personalities.

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Conflict of Interest Statement

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Intimate Partner Violence in Nigeria: A Review of the Literature

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Abstract

Intimate Partner Violence (IPV) is a pervasive human rights issue of great public health importance in Nigeria. This article aims to review and synthesize available knowledge on Intimate Partner Violence in Nigeria and provides information that fills the knowledge gap noted in international and global reports related to Nigeria's experiences. A literature search was conducted on empirical studies in English using the keywords 'Intimate, Partner, Violence, IPV AND Nigeria.' The databases searched were Research for Life r4Life, Google Scholar and ProQuest Central and the articles included in this review cover studies published from 2008 to 2023. The results show that IPV studies have multidimensional approaches and are influenced by multi-level predictors across cultural, socioeconomic, and educational factors. Interventions are therefore multiprong to address specific aspects depending on the context. Regional differences exist giving varied results, each community setting may have peculiarities that cannot be generalized to every Nigerian community. Future research should focus on large-scale community-based primary research to address IPV.

Keywords*: 'Intimate, Partner, Violence, Domestic Violence, IPV AND Nigeria.*

Introduction

Intimate Partner Violence (IPV) is a pervasive human rights violation of great public health importance worldwide [1, 2]. It refers to gender-related harm that can occur between two people who are/were in an intimate relationship [3, 4]. It has been defined by the World Health Organization as the behaviour within an intimate relationship that causes physical, psychological, and sexual harm to those in the relationship including physical aggression, sexual coercion, psychological abuse and controlling behaviour [5]. IPV is a major public health concern and a human rights violation that occurs globally [6, 7] and is of increasing concern in Nigeria [1]. Greater attention is being paid to intimate partner violence in recent times due to its effect on the survivor/victim and society at large [3]. In Nigeria, it was not a topic of discussion in the past due to the traditions and culture surrounding relationships between a man and a woman [3]. Intimate partners are referenced to include spouses; current or past, marital, or non-marital, boyfriends/girlfriends; current or past, whether they are living together or not [4]. The different forms of IPV include physical violence, sexual abuse, and psychological abuse [8]. Although men also experience IPV, women are more likely to be abused and suffer from the attendant effects of IPV [9, 10]. This article aims to review and synthesize available knowledge on Intimate Partner Violence in Nigeria and provides information that fills the knowledge gap noted in international and global reports related to Nigeria's experiences.

Materials and Method

A literature search was conducted of empirical studies through three databases: research for life (r4life), ProQuest Central and

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Google Scholar using the keywords, Intimate Partner Violence, IPV, Domestic Violence AND Nigeria. The studies analyzed spans period of 2008 to 2023, only studies conducted for Low Middle countries, sub-Saharan Africa that feature Nigeria and studies conducted entirely in Nigeria were considered.

Results/Discussion

Prevalences

The global prevalence of IPV is 30%, while that of Nigeria ranges between 33 – 68% [11]. Although high prevalence of 79.4% has been reported in Nigeria [12], the NDHS 2018 puts it at 33.8% [13]. Amongst the diverse types of IPV, psychological/emotional IPV is more prevalent in Nigeria more than physical or sexual violence [14, 15]. Some few studies however, demonstrated that physical violence is the most common type of violence encountered in the country [14]. IPV is on the increase especially following COVID 19 Pandemic [16]. Within Nigeria regional and geographical differences has been reported in different studies with Emotional/psychological Violence occurring more in the conservative northern societies than physical that is most seen in the more educationally advanced southern states [15]. The Southwest region with predominant Christian women who have attained secondary level education from richest wealth status are more likely to access health facilities for delivery and other reproductive Health services [15], however, Institutional studies in southwest of Nigeria reported IPV prevalence of 37% [9] and a lifetime risk of 70% [17].

In Jos, the northern part of the country, a prevalence of 31.8% among pregnant women have been reported, while a prevalence of 58.8% was documented among female university students in Kano Northern Nigeria [4]. In Ile-Ife, south-western Nigeria, the prevalence of IPV was found to be 36.7% while in rural community of Edo, southern Nigeria a prevalence of 79.4% has been reported [12]. The differences in methodology could account for the difference in the prevalences recorded in the different studies.

Determinants; Cause and effect

Different studies have proposed factors responsible for IPV and the Violence circle. Exposure to interparental violence [18], Lack of education has been associated with greater risk of IPV [15, 19]. Controlling and domineering attitudes of husbands are also risk factors for intimate partner violence in Nigeria [20].

Justification/acceptance of intimate partner violence (IPV) can account for the high prevalence of IPV among women [18, 21, 22], however in the study conducted by Benebo showed that the prevalence of IPV was higher among women who did not justify wife-beating, an isolated finding explained by the fact that these women are more at risk of IPV because by acting on their perceptions they attract discipline from their partner who may consider them insubordinate [11].

In Northern Nigeria, the penal code (section 55d) allows the punishment of wife by a husband for certain wrongdoings provided the husband did not inflict bodily harm [23]. Such institutional laws have been justification for wife beating and for women self-blame for the IPV over the years [24]. It has also been stated as the probable reason why women are reluctant to disclose history of violence in their relationship [4]. There are multiple evidence why women are not readily willing to disclose abuse, this include fear for themselves or for their children, fear of being judged by society, feelings of shame, consequences of seeking help, such as worsened revictimization [15].

Other identified predictors of IPV documented include large family size, close age gaps between spouses [25], ethnicity [26], household wealth [27], lack of education [28, 29], number of marital unions, rural place residence [21, 30] husband alcohol consumption [19], employment status of partners, and women's involvement in decision-making [21].

Social Construct

Nigeria is a patriarchal society and these shapes the way women are perceived, and their conventional role assigned [31]. Traditionally, women expected to birth and care for children, take care of the house, and be available for their spouses, or submit to their husbands' sexual needs [32]. Gender inequality [27] and acceptance by the society or the women to the behaviors expected of the patriarchal community has been associated with occurrence of IPV [1]. Women were twice as likely to justify wife beating than men [31]. In Nigeria according to NDHS 2018, 31% of women justified wife-beating with a range of 1% to 89% across the 36states of Nigeria [21]. The Justification for wife beating based on any of the following; if she burns the food, if she goes out without permission, she neglects the children, and she refuses to have sex with spouse/partner [13]. Other reasons seen as justification for wife beating are spousal demographic gap like economic status, place of residence, employment status of partners, and women's involvement in decision-making [21]. However, this trend is said to be reducing in other regions of sub-Saharan Africa where many women now reject all justification in husband beating their wives for any reason [21].

Although no religion condones IPV, many IPV perpetrators use religion as another weapon of abuse due to instructions differentially interpreted by them which may precipitate IPV [33, 34].

The theories discussed by researchers include the ecological model which 'explores the relationship between individual and contextual factors and considers violence as the product of multiple levels of influence on behavior' [35] has been used to explain the factors influencing violence which operate at individual, relationship, community, and societal levels [8]. Other theories discussed by researchers are the exchange theory and social control theory which has also been linked together to propose that violence will occur amongst intimate partners when there is no social control that binds people to order [27].

Health Related Outcomes

There is extremely low health seeking behavior amongst women who had been subjected to IPV; only 38.8% of these women seek for help in sub-Saharan Africa [36]. Patriarchal norms and values such as gender roles and expectations of women by society have also been reported to prevent women from seeking help for IPV [15]. This is mainly because IPV is seen as a social norm and accepted within communities in Nigeria [18, 36].

IPV is associated with an increase in exposed to diseases like human immunodeficiency virus (HIV) infection and other sexually transmitted infections [37]. These women who had IPV are more predisposed to induced abortion, having low birth weight, preterm birth [38], non-fatal injuries, and fatal injuries [39]. They can engage in harmful alcohol use, have more prevalence of depression [36] and are exposed to early dead or suicide [19].

Specific types of IPV are associated with health seeking behaviors: Physical IPV is associated with decrease attendance to antenatal care in pregnancy, while those affected by emotional do not deliver with skill birth attendant [40] and therefore are more susceptible to increased risk of reproductive complications [15].

Women who are survivors of IPV seek help from the informal structures usually from their family and friends, but only 1.9% sought help from the formal sector [36].

Interventions

Most studies highlight the importance of informational, informal, and legal interventions for IPV [28, 41]. Nigeria adopted world policies toward protection of women and girls from all forms of violence, this include the 2003

Protocol to the African Charter on Human and People's Rights of Women in Africa and the 2006 African Youth [20]. Women's health right issues were highlighted in policy making in the country and many states within the country; The National Gender Policy for the Nigeria Police Force (2010), the gender Policy in Health and Gender-based Violence (Prohibition) Law were established to curb violence against women [15]. Only 28 states have passed the law for violence against person called the VAPP Act 2015, amongst which very few are implementing the law [42].

In addition of these policies and laws to control IPV, community-based interventions that aim to modulate and influence society, mainly by addressing the traditional gender norms, roles, and expectations that are related to IPV have been documented by various researchers [36]. These gender transformative interventions for improving physical IPV outcomes are documented to be effective [43].

Although screening for IPV in healthcare is not yet routine practice in Nigeria, researchers have shown women willingness to be screened and supported in health institutions [44]. Reports of routine screening for domestic violence, supported counseling and supported referrals for women who required those services are increasingly being made across facilities in the country [45].

New Perspectives

Women with sexual autonomy were more likely to experience IPV [46] and women who exercised high household decision-making autonomy significantly experienced more IPV if they have partners with high controlling and domineering attitudes [20], however there are a few studies that find no significant association between female household decision-making autonomy and intimate partner violence [27]. Movement restriction and isolation predisposes to more IPV as seen during the COVID 19 pandemic [47]. Arm conflict increases occurrence of IPV especially that of women's experiencing controlling behavior by partner [48], insurgencies of recent has increased the rates of violence against women in the conflict-affected areas [49].

Conclusions

IPV has remained a public health concern in Nigeria [49]. Women and men attitude, justification for IPV, cultural, societal norms, tradition dictating gender roles has fueled the occurrence of IPV in the country [21, 27, 50]. Women autonomy, economic status and household decision making ability as a predictor of IPV has continue to yield conflicting results in studies conducted in Nigeria [21, 51]. Various theoretical models have been used to explain predictors of IPV [11, 16]. Interventions should include implementation of existing laws and policies against IPV and active client-oriented screening for IPV in health facilities [45]. Large community specific studies are required to add to the body of evidence.

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Conflict of Interest

The author declares no conflict of interests.

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Empowering and Equipping Parents with the Basic Intervention Skills in Handling their Children with Special Learning Needs

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Abstract

Parents of children with special learning needs face challenges balancing family needs without sacrificing care. For remote communities, difficulty accessing support compounds struggles. This qualitative phenomenological study explored an extension intervention program's effectiveness empowering parents of children with special needs. Through interviews with participating parents, thematic analysis revealed the program helped in three key empowerment dimensions. Firstly, parents transitioned from limited disability understanding to increased knowledge through educational resources. Secondly, feelings of isolation changed to supportive social networks via connections. Finally, the program equipped parents with resilience skills/mindsets moving from hopelessness towards effective coping. The multidimensional model addressed interrelated cognitive, social and emotional issues impacting parenting. Findings provide valuable insights how holistic, community programs successfully empower/support these families. Further research understands long term impacts and relationships to child outcomes.

Keywords: *Coping skills, Disability intervention, Family-centered care, Parental empowerment, Resilience, Special needs children.*

Introduction

Parents of children with special needs encounter distinct challenges [1]. Compared to parents of typically developing children, these individuals face heightened difficulties [2]. Effective skills are crucial for families to confront obstacles, including the need for collaboration to provide essential care and support [3]. Supporting parents cannot be understated, as research has indicated that parental advocacy and involvement possess the potential to yield positive effects on a child's resilience [3].

The significance of parental advocacy and involvement cannot be overstated for children with special needs. Parents serve crucial roles as models offering guidance, affection, support in development [4]. Furthermore, they facilitate independence, resilience, coping, mitigating parental stress [5]. Notably, a Malaysian study emphasized essential parental involvement optimizing academic attitude, social skills, emotional well-being, independence of children with special needs [6]. These findings underscore the critical, empowering parental role in fostering potential, shaping prospects, quality of life.

Families raising children with needs require support mechanisms addressing associated challenges [7, 8, 9]. Notably, parental support involves attaining strategies communicating self-care like eating/dressing [10]. Parents require comprehensive condition information, parenting skill development, emotional assistance as well [11, 12, 13]. Parents must

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coordinate with professionals supporting children with needs [14, 15]. Care coordination among parents, schools, healthcare ensures holistic care [16, 17]. These multifaceted supports complement the pivotal caregiver role in fostering development, self-care, daily needs.

Empowering parents of children with special needs requires us to comprehensively understand their experiences, challenges, and needs, as this task is intricate and demanding. According to Resch et al., [18], many parents face difficulties when advocating for their children with disabilities to access the necessary services within the school system, resulting in the underutilization of available resources. It is important to note that parents of children with special needs often experience higher levels of parental stress, which can negatively impact the well-being of both parents and children [19]. However, Han et al., [20] suggest that reinforcing factors, such as enhancing parenting efficacy, establishing effective organizational patterns, and improving communication processes, can alleviate family stress, leading to positive educational and developmental outcomes for children with special needs.

Not all parents possess the necessary skills to effectively handle the demands of caring for children with special needs, emphasizing the significant support these children require. To address this, researchers and professionals have developed numerous intervention programs to assist parents in meeting their children's needs [21, 22].

Abdullah and Omar [23] assert the effectiveness of these programs in improving the developmental outcomes of children with special needs. Moreover, these programs reduce parenting stress, enhance the parent-child relationship, and improve the overall quality of life for families with special needs [24].

However, the effectiveness of intervention programs designed to empower parents of children with special needs has limitations within the existing knowledge. One limitation is the scarcity of studies examining program effectiveness through extension programs. Extension involves disseminating and sustainably applying research-based knowledge in communities, crucial for transferring and maintaining proven interventions. The absence of extension poses challenges generalizing findings and assessing intervention effectiveness and sustainability, particularly in underserved communities [25].

Another limitation is the intervention program's failure to focus on the cultural context of execution. This is crucial as cultural identity influences parenting practices and beliefs regarding disability and inclusion [26]. Neglecting community culture may diminish relevance in other domains, particularly for low- and middle-income countries. The deficiency is pertinent in empowering programs targeted at underprivileged communities [27]. Also, literature is scarce on the crucial role of parent support groups and collaboration in interventions to enhance children with special needs [28].

Given the gaps and limitations in existing knowledge, this study seeks to analyze the effect of an extension program that employs an intervention program meant to extend support to parents of children with special learning abilities, especially in underserved and disenfranchised communities. The main objective was to determine whether parents become empowered by attaining the skills necessary to assist their children. This research will also consider the experiences of the parents involved to help them give their children with special needs with specific educational needs the best possible support. Specifically, the study sought to address the following research question: What are the experiences of parents who participate in an extension intervention program designed to empower them with the skills necessary to provide intervention to their children with special learning needs?

Materials and Methods

Research Design

This research study used phenomenology research method because the aim of the researchers is to describe accurately as possible the phenomenon, refraining from any pre-given framework, but remaining true to the facts. Phenomenology is concerned with the lived experiences of the people involved, or who were involved, with the issue that is being researched [29]. An interview guide was used by the researchers to capture their experiences. It usually involves in-depth interviews with subjects, and researchers had interviewed the same subject several times to get a full picture of the experience with the phenomenon [30].

Participants

Purposive sampling was used to select participants who had personal experience and knowledge of the phenomenon under study. This allows them to gather data based on their lived experiences, which is the main objective of phenomenological research [31]. Three parents or guardians of children with special education needs in one of the barangays, local Filipino name for a village or community [32], in the Northern Philippines were selected as participants, each handling different types of children with disabilities. The number of participants recommended in phenomenological research designs varies [33]. Some studies have successfully employed phenomenological research design with only two participants [34, 35, 36]. In addition, the said parents were recipients of the extension program that employed an intervention program that addressed catering to the needs of their children. This allowed them to describe their lived experiences in handling their children with special educational needs.

Data Gathering Tool

This study used a voice recorder to capture the responses of the participants. The researchers were guided by a general question in conducting the interview. Some follow-up questions were raised to gain deeper understanding of the answers of the participants. The researchers used an in-depth interview to ask open-ended questions orally and record the respondents' answers. Also, observations during the extension immersion schedules were used in the interpretation of data.

Data Gathering Procedure

The researchers sought permission from the Dean of the School of Teacher Education at Saint Louis University and the participants' parents before conducting the interviews. They assured confidentiality and provided an orientation on the purpose and significance of the study.

Participants were allowed to use their first language during the interview, which was recorded to capture all relevant responses. The interviews lasted around an hour to an hour and a half. All data collected were treated with confidentiality.

Treatment of Data

The study used a manual coding framework and a matrix to ensure data reliability. Interview results were mapped, allowing for a quick assessment and identification of repetitive occurrences of action/data that appeared more than twice [37].

To analyze the gathered data, the researchers employed Moustakas' [38] transcendental data analysis framework. The researchers initially read the transcriptions, gaining a comprehensive understanding of the participants' lived experiences. They then identified significant statements by highlighting relevant words, phrases, and statements that described the participants' experiences in handling their children with special education needs. These significant statements were transferred to the matrix for coding, where themes were identified after a final review.

Results

The findings reveal three major themes representing different dimensions of family empowerment: From Limited Understanding to Increased Knowledge, From Isolation to Shared Responsibility, and From Hopelessness to Resilience.

From Limited Understanding to Increased Knowledge

This theme represents the parents' transition from a lack of accurate knowledge about their child's disability to an increased understanding of the disability, the child's needs, and strategies to support their development. Through education in the extension program, they gained improved knowledge of the disability itself, the child's needs and abilities, and strategies to support development.

Before the program, the father of Child A admitted: *"I did not understand at all my child's disability."* He relied on inaccurate information, saying "*One person from the community health center said, that her brain might have been twisted."*

After the program, he reported: *"I now at least have a clearer understanding of her limitations."* And he gave examples of new strategies like using music to calm her tantrums.

Similarly, Child B's parents originally believed incorrectly that her heart condition affected her intellect: *"Her ability to think might have been affected by her heart condition."*

But after the program, the mother shared: *"We have a clearer understanding regarding our child's special needs and abilities."*

From Isolation to Shared Responsibility

This theme corresponds to how parents moved from feeling isolated and solely responsible for their child's care to feeling supported by a network of family, friends, and external resources. By sharing duties and accessing services, they transitioned from isolation to shared responsibility.

The father of Child A reported: *"I learned to ask from others like my friends, social workers, from relatives and others who can help me understand my child's disability."* He accessed services like *"free therapy sessions"* for his daughter.

He also said: *"The other family members are now more involved. I don't force them anymore to help me take good care of her."*

Similarly, Child B's parents shared: *"Now, we all have the courage and motivation to attend seminars concerning the condition of our child."* And *"Almost all of our family members and relatives are well-informed regarding the condition of our daughter."*

From Hopelessness to Resilience

This theme signifies parents transitioning from feelings of despair and inability to cope with their child's disability, to developing positive mindsets, strategies, and supports that increase their resilience. Ongoing access to social support and coping resources empowered them to manage challenges.

The father of Child A reported improved coping through family support: *"I usually get comfort from my own family members. I ask advice now from them and we all share insights."*

He also accessed external support: *"I am also taking advantage of the rare free therapies offered from some institutions."*

Child B's father reframed his mindset: *"One of the coping mechanisms is to maintain a positive outlook in life. Instead of thinking negatively about her condition, I take it as a challenge to help her more achieve her full potentials."*

The mother connected with other parents: *"I usually connect with other parents who are raising a child with disabilities."*

And the family worked together: *"Now, the best thing that we do is to work together as a family."*

Discussion

The main objective of this study was to determine whether parents become empowered by attaining the skills necessary to assist their children with special needs through an extension program that employs an intervention program. Three major themes representing different dimensions of family empowerment were found: From limited understanding to increased knowledge, from isolation to shared responsibility, and from hopelessness to resilience. Together, these themes illustrate the multidimensional impacts of the extension program on cognitive, social, and emotional empowerment of parents of children with disabilities.

Regarding theme one, from limited understanding to increased knowledge, the findings show that prior to the extension program, parents had limited and inaccurate knowledge about their child's disability. This has led to misconceptions, inappropriate expectations, and the inability to meet their child's needs. Through education and training in the program, parents gained accurate information about their disability and their child's abilities and needs. This increased knowledge empowered them with new strategies for supporting their children's development and participation. These findings align with previous research showing that parent education and training programs improve disability-related knowledge and understanding [39, 40]. Lack of knowledge leads to negative impacts, whereas increased knowledge enables parents to be more responsive and better advocate for their child [41]. The extension program followed best practices by addressing both knowledge gaps and incorrect beliefs. The results highlight that limited parental knowledge is a major barrier to meeting children's needs. Parental education through community programs is essential for providing accurate information. Programs must assess and address both a lack of information and misconceptions. Increased knowledge empowers parents to understand and support their children's development.

In relation to the second theme, from isolation to shared responsibility, the findings indicated that prior to the program, parents felt solely responsible and isolated in caring for their child with disabilities. They lack connections with their families and communities to find support. Through education and outreach in the program, parents built empowering social networks. Family members became more involved in sharing their caregiving duties. Parents also accessed external disability services and made connections with others. This relieves the burden of isolation and the sole responsibility. Previous research shows social support improves wellbeing and reduces stress in parents of children with disabilities [42, 43]. Support from family, friends, professionals, and other parents enables collective caregiving rather than isolation [44]. This aligns with the current findings that building social connections is an important dimension of empowerment. The findings highlight that parents of children with disabilities often feel alone and responsible. Programs should actively facilitate social support systems within families and link parents to resources. Reducing isolation through shared responsibility improves parental and family wellbeing.

The final theme, transitioning from a sense of hopelessness to resilience, was evident in the research findings, which indicated that before participating in the program, parents experienced feelings of despair, stress, and a lack of ability to effectively manage the difficulties associated with raising a child with disabilities. Through education and skills training in the program, they developed more positive mindsets, helpful coping strategies, and social support. This facilitates the transition from hopelessness to resilience. Ongoing resources have enabled them to reframe struggles and to work together to manage challenges. Previous research found that

training programs improved parents' positive thinking, reframing coping abilities, use of support, and resilience [45, 46]. Resilience factors such as optimism, social support, and collaborative family coping reduce stress and improve adaptation [47]. The current findings align with the literature on building resilience through multi-faceted interventions. The results demonstrated that parents of children with disabilities often face despair and lack coping skills. Programs should actively equip parents with positive strategies and connect them with formal and informal support systems. Fostering resilience is crucial for both parental and family well-being.

Conclusion

This study found that an extension intervention program was effective in empowering the parents of children with special needs across multiple dimensions. Through education and skills training, parents experience a transition from limited, inaccurate knowledge about their child's disability to an increased, accurate understanding. This knowledge empowerment provided them with new strategies to support their children's development and participation. Parents also progressed from feelings of isolation and sole responsibility to establishing support networks for family, friends, and disability services. By building social connections and sharing duties, they reduce burden and stress. Finally, parents develop greater resilience by learning positive mindsets and concrete coping strategies. Ongoing access to social and coping resources is key to managing challenges.

Taken together, these results demonstrate that a community-based parent extension program can achieve empowerment by addressing inter-related cognitive, social, and emotional needs. Improved knowledge of disabilities is a crucial foundation. Shared responsibility through social support reduces isolation. Resilience skills build the capacity to cope with ongoing challenges. This multifaceted empowerment model aligns with previous research and has important implications for serving families of children with disabilities through holistic education, connection, and skills training.

This study's qualitative design provided rich insights into parents' experiences but was limited to a small sample. Further research could quantify the impacts of empowerment using validated scales. Assessing children's outcomes would also determine their effects on development and quality of life. Nonetheless, the current findings provide a strong basis for implementing multidimensional parent empowerment programs to improve family adaptation and well-being. With adequate support, parents can gain the understanding, connections, and resilience needed to positively manage their child's disability.

Conflict of Interest

The authors declare that there are no conflicts of interest pertaining to the research presented in this manuscript.

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Factors Affecting Skill Acquisition during Clinical Learning Among Preservice Registered Nursing Students at Levy Mwanawasa Medical University in Lusaka, Zambia

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Abstract

Clinical learning is integral to nursing education, essential for the competence development required in a three-year diploma program. This research aimed to investigate factors affecting skill acquisition during clinical learning among preservice Registered Nursing students at Levy Mwanawasa Medical University in Lusaka, Zambia. A cross-sectional descriptive design, employing a self-administered adapted questionnaire pretested for reliability in the UK and Swaziland (Cronbach's alpha: 0.77–0.96, correlation: 0.74) was used. Stratified random sampling based on training level selected 80 participants meeting inclusion criteria through a random sampling method. Data analysis included descriptive statistics, chi-square tests, and binary logistic regression using SPSS version 26, with a 95% confidence interval and 5% significance level. The study identified four predictors significantly correlated with skill acquisition during clinical learning: inadequate supportive learning environment (100%, n=80, p=0.003), inadequate Student-Patients allocation (83.75%, p=0.048), and inadequate Resources (56.25%, p=0.002), and inadequate motivation to learn (51.25%, p=0.037). Incompetence of clinical instructors and mentors (57.5%, p=0.233) and mild Anxiety (85%, p=0.762). Binary Logistic Regression, adjusted for independent variables, indicated that an improved supportive learning environment decreased skill acquisition odds (Odds Ratio=0.049, p=0.025), while increased resource availability raised odds (Odds Ratio=3.338, p=0.01) for students who perceived these variables as inadequate. The omnibus test was significant (chi-square=14.095, p=0.015), accurately classifying 72.5% of cases. Collaboration among educators, clinical staff, and policymakers is crucial for enhancing nursing education quality by addressing factors affecting clinical skills acquisition.

Keywords: *Anxiety, clinical learning, competence of clinical instructors and mentors, resources, skill acquisition, supportive learning environment.*

Introduction

Clinical experience has been always an integral part of nursing education. Clinical practice stimulates students to use their critical thinking skills for problem solving, though learning experiences for nursing students may be painful. Clinical learning is an indispensable part of nursing education programme and an integration of theoretical and practical learning experiences which plays an important role in the acquisition of professional abilities [1]. Clinical learning is the means by which nursing students learn to apply the theory of nursing, facilitating integration of theoretical knowledge and practical skills in the clinical setting which becomes the art and science of nursing. It is the basis on the development of professional nursing. It prepares student nurses to be able to do as well as to know the clinical principles in practice [2] Acquisition of clinical skills has

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been shown to improve the quality of care provided to patients when care providers are competent [3]. Acquisition of clinical skills is achieved through clinical learning. Equipping nursing students with clinical skills and knowledge corresponds with the demands of the nurse's role as the primary goal of nursing education [2]. Benner's "novice to expert" theory, rooted in the Dreyfus model of skill acquisition, guides clinical teaching in nursing by delineating five levels of skill development. This progression involves a shift from abstract principles to the integration of concrete experiences, with a unique emphasis on the relational aspect of nursing care, distinguishing it from other psychomotor skill models [4]. Learning takes place when students apply what they have learnt in the classroom situation and practiced in the skills laboratory into the reality of nursing [5]. Social learning interactions support students in gaining a deeper comprehension and acquiring new insights, with the use of different learning styles promoting skill acquisition [6]. The assessment of nursing students based on their level of training and Benner's Model stages within the framework of Social Constructivism helps identify factors affecting skill acquisition in clinical practice [2] In this study, skill acquisition refers to the process of developing the necessary competencies to become a Registered Nurse, measured by the effectiveness of clinical placements. Despite the Nursing and Midwifery Council of Zambia (NMCZ) implementing an enhanced curriculum to improve learning and facilitate the integration of theory into practice, aiming to foster the acquisition of cognitive, psychomotor, and affective skills among nursing students, it has been noted that there persists a challenge of subpar performance in clinical skills [7]. This is evident in numerous nursing schools, and graduates from nursing colleges often lack the essential competence needed to deliver high-quality care to patients in the majority of hospitals. Shortages in clinical staff also contribute to irregular supervision and mentoring of registered nursing students in Sub-Saharan Africa, impeding effective competence development [8, 9]. The existing information on factors influencing skill acquisition among preservice Registered Nursing students lacks specificity, scope, context-specific relevance, and may be outdated. Recognizing these limitations and the need for more detailed investigation, the study aimed to address these gaps by specifically focusing on students from Levy Mwanawasa Medical University in Lusaka (LMMU), Zambia. With a background as a nurse educator, the researcher sought to investigate and explain the factors affecting skill acquisition during clinical learning, aimed at improving student performance and elevate the standard of patient care by enhancing clinical education.

Specifically, the study sought to determine the level of skill acquisition during clinical learning and to identify factors that affect skill acquisition during clinical learning among preservice Registered Nursing students.

Justification of the Study

There was need to conduct this research to investigate and explain the factors affecting skill acquisition during clinical learning among preservice registered nursing students from LMMU, in Lusaka, Zambia. The outcomes of the research will also be advantageous for other institutions, policymakers, and regulatory bodies engaged in the education of nurses, contributing to the enhancement of quality clinical training.

Materials and Methods

Study Design and Area

This research utilised a quantitative, cross-sectional descriptive design. The study was conducted at LMMU. LMMU is a public university and first ever specialized University for health studies in Lusaka, Zambia. The main campus of the university is in Chainama Hill, in northeastern Lusaka. The LMMU School of Nursing is one of the schools at LMMU and is recognized nationally and internationally for excellence in educating and training healthcare

workers for Zambia and the Southern Africa region. Amongst the programs offered by LMMU, School of Nursing is preservice registered nursing. The choice of the study area was determined by interest in relation to research problems, familiarity of the locality where the researcher is working, making data collection less cumbersome, simplifying the process of data collection. Beyond convenience, this choice enhanced access to participants, provided logistical ease, contributed to cultural understanding, addressed ethical considerations, improved data quality and leveraged existing resources.

Study Population

The study population included all the one hundred (100) second year nursing students enrolled in the preservice diploma in registered nursing program at LMMU, School of Nursing.

Sampling Method

The study population was divided into subgroups or strata according to year of study. Using a method of stratified random sampling determined by training level, 80 participants meeting the inclusion criteria were randomly selected.

Sample Size

Sample size is the number of participants in a sample [10]. The sample size was calculated manually using formula [11] for determining small sample size. The total population for second year of training nursing students pursuing a preservice diploma in registered nursing in the regular approach was 100.

$$Sample\ Size\ (S) = \frac{X^2NP(1-P)}{d^2(N-1)+X^2P(1-P)}$$

S = the required sample size

N = Population size

X = Z value (e.g. 1.96 for 95% confident level)

P = Population proportion (expressed as decimal) (assumed to be 0.5(50%)

d= Degree of accuracy (5%) expressed as a proportion (0.05); it is the margin of error

$$Sample\ Size\ (S) = \frac{X^2NP(1-P)}{d^2(N-1)+X^2P(1-P)}$$

$$= \frac{1.96^2(100)0.5\ (1-0.5)}{0.05^2(100-1)+1.96^2(0.5)(1-0.5)}$$

$$\frac{96.04}{1.2079} = 79.51.$$

Therefore S = 80 participants

Inclusion Criteria

The study included participants who met specific inclusion criteria: Nursing students aged 18 years and above, with over one year of training, having undergone at least one clinical allocation lasting a minimum of ten (10) weeks at the time of the study. This ensured participant maturity, foundational knowledge, and substantial exposure to clinical practice, enhancing the study's quality and relevance by including individuals with the necessary attributes and experiences related to clinical skills and competence and Second-year nursing students who were available and willing to participate in the study.

Exclusion Criteria

Those who did not meet the inclusion criteria set by the researcher were excluded from the study, that is, nursing students who did not give consent.

Data Collection Tool

A self-administered adapted structured questionnaire as the data collection tool, from the clinical learning environment and teaching scale (CLES-Scale) by Mikko Saarikoski's. The tool was validated and tested for its reliability, validity, and sensitivity to change. The tool had the Cronbach's alpha ranging from 0.77 to 0.96 and correlation coefficient at 0.74, respectively [12, 13].

Pilot Study

Prior to the main study, the effectiveness of the data collection tool was evaluated through a pilot study/pre-test, which involved second-year

nursing students. A sample size equivalent to 10% of the calculated total, amounting to eight (8) respondents, was utilised. This process assisted the researcher in identifying any components that required modification. Following the pre-test, necessary adjustments were made to the self-administered questionnaire by the researcher before the commencement of the actual study.

Data Collection Technique

Data collection method used was in-person survey. Survey research means collecting information about a group of people by asking them questions and analysing results [14]. The questionnaires were distributed to each nursing student at a time when they were on school campus during class session breaks for participants' privacy.

Data Analysis

Data analysis involved descriptive statistics, chi-square test as well as the Fisher's exact test for values that are less than 5, testing for associations, and binary logistic regression using SPSS version 26, Confidence interval was set at 95% and 5% level of significance.

Ethical and Cultural Considerations

Ethical approval and clearance were sought from University of Zambia Biomedical Research Ethics Committee (UNZABREC) Reference Number: 3529 – 2022 (Appendix VI), National Health Research Authority (NHRA) Approval Ref No: NHRA0022/11/05/2023 (Appendix VII). NHRA Registration Number: NHAR-R-1423/28/11/2022 A written permission was sought from the Dean of LMMU School of Nursing and from the Principal of School of Nursing at Sanridge Institute of Health and Social Sciences for study and pilot study respectively.

In obtaining written consent, participants were informed about the study's purpose, nonmaleficence was maintained through the absence of harm-inducing procedures and protection from psychological distress during questioning. The principle of justice was observed by equal treatment and random selection, while beneficence was upheld by the potential contribution of research outcomes to knowledge without imposing adverse consequences on participants who could freely withdraw.

Results

Clinical Skill Acquisition characteristics were adjusted based on test assumptions outlined by [2], and classifications were assigned according to statistical outcomes and variable cut-off points using SPSS version 26

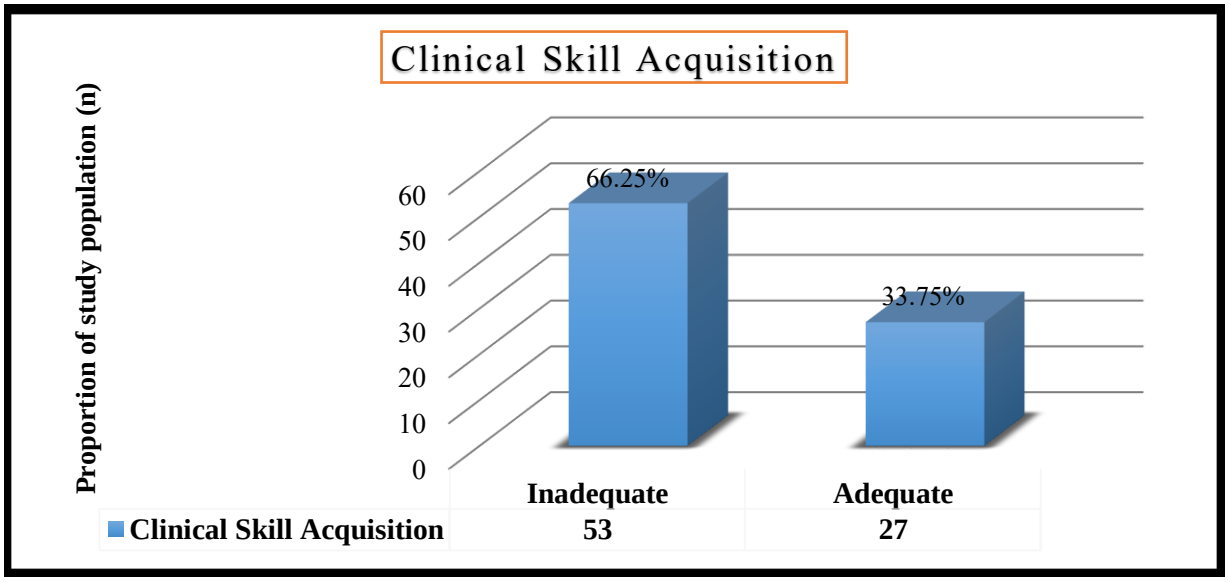

Figure 1. Summary of Clinical Skill Acquisition (n=80)

Figure 1 shows that out of the 80 respondents, (66.25%, n=53) reported inadequate clinical skill acquisition while (33.75%, n=27) reported adequate clinical skill acquisition.

Table 1 summarizes the relationship between Skill Acquisition and Environmental Factors.

Table 1. Relationship between Skill Acquisition and Environmental Factors (n=80)

Independent Variable	**Skill Acquisition**		**Total**	**p- value**
	Inadequate	**Adequate**		
Environmental Factors				
1. Support Structure				
Supportive learning environment				
Inadequate	53 (66.25%)	27 (33.75%)	**80 (100%)**	**0.003**
Adequate	0 (0%)	0 (0%)	**0 (0%)**	
Very Adequate	0 (0%)	0 (0%)	**0 (0%)**	
Total	**53 (66.25%)**	**27 (33.75%)**	**80 (100%)**	
Competence of clinical instructors and mentors				
Inadequate	34 (73.9%)	12 (26.1%)	**46 (100%)**	**0.233**
Adequate	17 (56.7%)	13 (43.3%)	**30 (100%)**	
Very Adequate	2 (50%)	2 (50%)	**4 (100%)**	0.121 [FE]
Total	**53 (66.25%)**	**27 (33.75%)**	-	-
2. Management of Resources				
Student-Patients allocation:				
Inadequate	48 (71.6%)	19 (28.4%)	**67 (100%)**	**0.048**
Adequate	5 (41.7%)	7 (58.3%)	**12 (100%)**	
Very Adequate	0 (0%)	1 (100%)	**1 (100%)**	0.025[FE]
Total	**53 (66.25%)**	**27 (33.75%)**	-	-
3. Availability of Resources				
Inadequate	37 (82.2%)	8 (17.8%)	**45 (100%)**	**0.002**
Adequate	14 (48.3%)	15 (51.7%)	**29 (100%)**	
Very Adequate	2 (33.3%)	4 (66.7%)	**6 (100%)**	0.004 [FE]
Total	**53 (66.25%)**	**27 (33.75%)**	-	-

FE= Fisher's exact test

Support Structure: Supportive Learning Environment: The findings show an association between skill acquisition and supportive learning environment which is statistically significant with the P-value of 0.003.

Competence of Clinical Instructors and Mentors: The findings show no association between skill acquisition and competence of clinical instructors and mentors which is statistically insignificant with the P-value of 0.233. The chi-square value was 2.913; p-value for the Pearson test was 0.233 and 0.121 [FE]. The degrees of freedom (df) were 2. (Chi-square value=2.913, df=2 and p-value=0.233). We do not reject the null hypothesis of no significant association between the variables being tested.

Management of Resources: Student-Patients Allocation: The findings show an association between skill acquisition and student-patient allocation which is statistically significant with the P-value of 0.048 and 0.025[FE]. The Pearson chi-square value is 6.078 with 2 degrees of freedom. (Chi-square value=6.078, df=2 and p-value=0.048). We reject the null hypothesis of no significant association between the variables being tested

and conclude that there is a significant association.

Availability of Resources: The findings show an association between skill acquisition and availability of resources, which is statistically significant with the P-value of 0.002. The chi-square was 12.232. The p-value for the Pearson test was 0.002 and 0.004 [FE]. The degrees of freedom (df) were 2. (Chi-square value=12.232, df=2 and p-value=0.002). We reject the null hypothesis of no significant association between the variables being tested, and conclude that there is a significant association.

Table 2 summaries the Relationship between Skill Acquisition and Student Related Factors.

Table 2. Relationship between Skill Acquisition and Student Related Factors

Independent Variable	**Skill Acquisition**		**Total**	**p- value**
	Inadequate	**Adequate**		
Student Related Factors:				
Motivation to learn:				
Inadequate	28 (77.8%)	8 (22.2%)	**36 (100%)**	**0.032**
Adequate	22 (53.7%)	19 (46.3%)	**41 (100%)**	
Very Adequate	3 (100%)	0 (0%)	**3 (100%)**	0.040 [FE]
Total	**53 (66.25%)**	**27 (33.75%)**	-	-
Anxiety:				
Mild	45 (66.2%)	23 (33.8%)	**68 (100%)**	**0.762**
Moderate	7 (63.6%)	4 (36.4%)	**11 (100%)**	
Severe	1 (100%)	0 (0%)	**1 (100%)**	1.000 [FE]
Total	**53 (66.25%)**	**27 (33.75%)**	-	-

FE= Fisher's exact test

Motivation to Learn: The findings indicate that motivation to learn may have an influence on skill acquisition, with higher levels of motivation potentially associated with better skill acquisition outcomes which is statistically significant with the P-value of 0.032. The chi-square test is 6.575 and the degrees of freedom (df) are 2. (Chi-square value=6.575, df=2 and p-value=0.032). The p-value is 0.032, and 0.040 [FE] indicating that there is evidence to reject the null hypothesis of no association between the two variables.

Anxiety: The Pearson Chi-Square test statistic is 0.543, 2 degrees of freedom. (Chi-square value=0.543, df=2 and p-value=0.762). The asymptotic p-value is relatively high at 0.762 and 1.000 [FE] which suggests that there is not strong evidence to reject the null hypothesis of independence.

Binary Logistic Regression Analysis adjusted for Environmental and student factors affecting Skill Acquisition during Clinical Learning

Binary logistic regression analysis showed that odds of predictor variables, supportive learning environment were 0.049 times towards skill acquisition. The p-value was 0.025, which suggested that the baseline odds of skill acquisition are significantly lower than the odds when other predictor variables are present and is also statistically significant relationship with skill acquisition. Competence of clinical instructors and mentors is associated with 1.068 times increase in the odds of skill acquisition. However, the high p-value of 0.9 suggests that this relationship is not statistically significant; Student-Patients allocation is associated with 2.182 times increase in the odds of skill acquisition. However, the p-value of 0.301

suggests that this relationship is not statistically significant. Availability of Resources is associated with 3.338 times increase in the odds of skill acquisition. The low p-value of 0.01 suggests that this relationship is statistically significant. Motivation to learn odds ratio is 1.019. However, the p-value is 0.968, indicating that it is not statistically significant. This suggests that there is no substantial impact of motivation to learn on the odds of skill acquisition and Anxiety odds ratio is 0.587. Although the odds ratio is less than 1, indicating a negative association between anxiety and skill acquisition, the p-value of 0.453 suggests that this relationship is not statistically significant. Therefore, the results do not provide strong evidence for the impact of anxiety on the odds of skill acquisition.

The regression model was statistically significant (X^2 = 14.095, p = 0.015) indicating that the independent variables as a set are significantly related to the dependent variable. The final model correctly classified 72.5% of cases, with 58 cases. In the model or equation, changes in Availability of Resources from inadequate to adequate to very adequate impacted significantly on the model, with p-value of 0.01 and supportive learning environment which was inadequate, and p-values of 0.025.

Table 3. Binary Logistic Regression of Factors Affecting Skill Acquisition (n=80)

Variables		**B**	**Sig.**	**EXP (B)**	**95% C.I. for EXP(B)**	
					Lower	**Upper**
Supportive Learning Environment	**Ref: Inadequate** Adequate	3.009	**0.025**	**0.049**	-	-
Competence of clinical instructors and mentors	**Ref: Inadequate** Adequate	0.066	0.9	**1.068**	0.384	2.975
Student-Patients allocation	**Ref: Inadequate** Adequate	0.78	0.301	**2.182**	0.498	9.567
Availability of Resources	**Ref: Inadequate** Adequate	1.205	**0.01**	**3.338**	1.337	8.334
Motivation to learn	**Ref: Inadequate** Adequate	0.019	0.968	**1.019**	0.398	2.61
Anxiety	**Ref: Severe** Mild	0.534	0.453	**0.587**	0.146	2.363

B or cOR = Crude Odds Ratio, EXP(B) or **aOR** = Adjusted Odds Ratio, **CI** = Confidence interval

Discussion of Findings

Socio-Demographic Factors of The Study Population

Most of the participants were aged between 18 - 30 years and the mean age was 22.05 years. This was attributed to the fact that most of the participants were enrolled in training after the 18th birthday or later. In Zambia, the average age of people beginning tertiary education is 18-24 years [15].

There were 80 pre-service Registered Nursing students included in the study. Of these students, 83.8% were female and 16.3% were male. Nursing being a female dominated profession [16]. The age of the students ranged from 18 to 30 years, with a mean age of 22.05 years, a median age of 21 years, and a mode of 21 years.

The standard deviation of the age variable was 2.728 and the variance was 7.441. This suggests that the age of the students was relatively tightly clustered around the mean. All the pre-service students included in the study were in their second year of training.

Discussion on Each Variable

Skill Acquisition

In this study, Clinical skills acquisition refers to the process of acquiring and developing nursing skills and competencies necessary to become a Registered Nurse, as measured by the effectiveness of clinical placements. A significant proportion of respondents, 53.8%, were either not sure or did not feel that the duration of their placements was adequate. This suggests a need for improvement in the duration of placements to ensure that trainees have adequate time to acquire the necessary skills. This is in line with a study by [17] who explained that the curriculum emphasizes the importance of both classroom and clinical learning in the acquisition of nursing competencies. The course outline is structured to reflect a progression of difficulty from basic to advanced levels, ensuring that students develop a thorough understanding of the required knowledge and skills. More than three quarters agreed or strongly agreed that the objectives and guidelines of their training were clear. However, a small portion disagreed or strongly disagreed or were unsure, indicating that there is still room for improvement in communicating objectives and guidelines to trainees. This is like a study by [18] which found that providing students with a copy of the clinical objectives for their assigned clinical placement helps enhance their understanding of the tasks to be performed.

A significant proportion of respondents, 68.8%, either disagreed or strongly disagreed or were unsure that the theory taught was in line with practice which suggests that there may be a gap between theory and practical application. This is in line with the study conducted in Malawi by [5] who identified a significant challenge for nursing students in the gap between theory and practice. Many students reported dissatisfaction with the integration of theoretical knowledge into clinical practice. Despite having a lot of theoretical knowledge, they lacked opportunities to apply it in practice. A study in Iran by [19], alluded to the fact that the clinical environment is complex and rapidly changing, with a variety of new settings and roles in which nurses must be prepared to apply the knowledge they have learnt, this thus, demands a new approach to teaching and learning. This is contrary to the current study which revealed that only 43.8% agreed or strongly agreed that patients are managed upholding ethical principles according to what is taught in class. This suggests that there is a significant gap between the ethical principles taught in the classroom and what is applied in practice, which have implications for patient outcomes. Most respondents, 70%, agreed or strongly agreed that practical assessments were given for specific procedures, suggesting that practical assessments are generally seen as an effective way to evaluate trainee performance. Similar observations were made in studies conducted in Canada by [20], who suggested that academic and clinical educators should provide clinical nurses with an outline of student competencies and learning needs at the beginning of each clinical rotation. A majority of the respondents perceived their clinical skill acquisition as inadequate. It appears that there may be areas for improvement in the duration of placements, communication of objectives and guidelines, and the alignment between theory and practice. It may be beneficial for those responsible for clinical training to review these results and consider potential interventions or changes to address these issues. This agrees with a study by [20], who concluded that developing clinical skills is essential in forming the professional identity of nursing students and ensuring they are ready to meet the challenges of the nursing field.

Summary of Environmental Factors Affecting Skill Acquisition

Based on respondents~ perception, the supportive learning environment was inadequate (100%, n=80), Competence of clinical instructors and mentors was inadequate (57.5%,

n=46), Student-Patients allocation was inadequate (83.75%, n=67), Resources were inadequate (56.25%, n=45). These results are corresponding to a study by Mwale and Kalawa (2016) who suggested that effective clinical supervision, appropriate patient assignments to students can provide students with feedback and support that can enhance their confidence and competence in clinical practice. Appropriate patient assignments can help students feel more comfortable and capable of providing care, while case presentations can provide opportunities for students to learn from their peers and reflect on their experiences.

Summary of Student Factors Affecting Skill Acquisition

The distribution of responses for the two student-related factors were inadequate motivation to learn or lack of motivation to learn (51.25%, n=41) and mild anxiety (85%, n=68). Similarly, in a study by [21], they suggested that stress and anxiety are not only workplace problems, but they can also hinder students' learning due to various stressors. Many students reported anxiety as one of the factors that impact their performance in clinical practice as well as lack of motivation. This anxiety is rooted in the students' empathy for their patients.

Relationship Among Dependent and Independent Variables

Relationship Between Skill Acquisition and Environmental Factors

Supportive Learning Environment: It indicates that individuals with an inadequate support structure are more likely to have inadequate skill acquisition compared to those with an adequate support structure. This is in line with a study by [4] who concluded that learning in the clinical environment provides the real-world context for nursing students to develop the knowledge, skills, attitudes and values of a registered nurse.

Initially all nursing students are considered novices upon commencing the nursing training because they do not have or have very minimal previous knowledge on clinical practice and progress to advanced beginner, competent, proficient and expert.

Competence Of Clinical Instructors and Mentors: It indicates that individuals who reported incompetence among their instructors and mentors were more likely to express inadequate skill acquisition. On the other hand, those who reported adequate or very adequate competence had a higher likelihood of expressing adequate skill acquisition. The chi-square test results suggest some association, but the p-value of 0.233 indicates that the association is not statistically significant.

Management of Resources: Student-Patients Allocation: The findings suggests that inadequate management of student-patient allocation results in inadequate skill acquisition. It also indicates that some respondents reported adequate management but still expressed inadequate skill acquisition. We reject the null hypothesis of no significant association between the variables being tested and conclude that there is a significant association**.** This study was in line with [7] who noted that the learning process of nursing students was negatively affected due to the overcrowding of wards.

Availability of Resources: The findings suggested that environmental factors such as support structure, competence of clinical instructors and mentors, student-patients allocation and availability of resources play a role in skill acquisition. Addressing and improving these factors may contribute to better skill acquisition outcomes among the respondents.

These results are corresponding to [7] study, which found that nursing students' clinical learning and skill acquisition are adversely affected by various factors, including staff shortages, unavailability of ward managers for consultations, and unaccompanied as well as clinical supervisors being difficult to access.

Relationship Between Skill Acquisition and Student Related Factors

The findings indicated that Motivation to learn may have an influence on skill acquisition, with higher levels of motivation potentially associated with better skill acquisition outcomes which is statistically significant with the P-value of 0.037, indicating that there is evidence to reject the null hypothesis of no association between the two variables. Similarly, [22] concluded that lack of initiative by students in their own learning of skills is a hindrance in its own.

Anxiety: Respondents also experienced varying levels of anxiety, with a significant proportion (66.2%, n=45) who reported mild anxiety expressed inadequate skill acquisition. While the relationship between anxiety and skill acquisition which is statistically insignificant with the P-value of 0.762, may not be as pronounced as with motivation to learn, it is worth considering the potential impact of anxiety on skill acquisition outcomes. The asymptotic p-value is relatively high at 0.762 which suggests that there is not strong evidence to reject the null hypothesis of independence. In related research, [23] discovered an indeterminate amount of stress and anxiety that hindered nursing students' comfort and ability to acquire new skills during clinical practice. Although the word is the ideal place to learn, very few learners' needs are met in this environment [1].

Binary Logistic Regression Determining the Relationship Between Skill Acquisition and Environmental and Student Factors

Binary logistic regression analysis showed odds of predictor variables. The odds of predictor variable supportive learning environment were 0.049 times towards skill acquisition. The p-value was 0.025, which suggested that the baseline odds of skill acquisition are significantly lower than the odds when other predictor variables are present and is also statistically significant relationship with skill acquisition. A one-unit increase in Availability of Resources is associated with 3.338 times increase in the odds of skill acquisition. The low p-value of 0.01 suggests that this relationship is statistically significant.

The associations between the variables and the outcome can change when accounting for other factors (multivariable analysis). Some variables, like Availability of Resources, became more statistically significant and have a stronger impact on the outcome when other variables are considered. Others, like Competence of Clinical Instructors and Mentors and Motivation to Learn, do not show significant associations in either univariate or multivariable analyses. The significance level (p-value) helps determine the statistical significance of these associations. These findings suggested that it is important for educators and trainers to consider the different factors that may influence skill acquisition in learners, including their supportive learning environment and availability of resources.

This is like [24], who concluded that having a high number of students in one placement area during clinical training leads to a reduction in the learning opportunities available for student nurses. Creating a more supportive and collaborative environment may lead to improved learning outcomes for students and a more positive experience during their clinical placements.

This is also in line with a study conducted by [25] in Cameroon, a major challenge facing student nurses during their practical training is a lack of equipment and at times not working, which makes it difficult for them to acquire the necessary skills.

Overall Significance of The Regression Model

The omnibus tests of model coefficients showed that the model is significant ($p = 0.015$), indicating that at least one of the independent variables is significantly associated with the

dependent variable and that this model outperforms the null model. The classification table shows that the model correctly classified 72.5% of cases. The independent variables included in the model are: Supportive learning environment, Competence of clinical instructors and mentors, Student-Patients allocation, Availability of Resources and Anxiety.

Conclusion

The study revealed that an unsupportive learning environment, inadequate student-patient allocation, resource shortages, and low motivation significantly hindered skill acquisition in clinical learning. However, perceived incompetence of instructors and mentors, as well as mild anxiety, showed no significant impact. Addressing these issues can enhance overall skill development during clinical learning.

Recommendations

1. Nursing educators should consider collaborating with healthcare institutions to ensure that clinical placements provide a conducive environment for learning and practice, with adequate supervision and resources.
2. The nursing school management should invest in adequate resources, both human and material, to ensure a conducive learning environment for the nursing students. This includes having sufficient staffing levels, clinical supplies and equipment, and a comfortable and safe clinical setting.
3. The Ministry of Health should continue expanding the training and employment of registered nurses.
4. The Nursing and Midwifery Council of Zambia should continue to encourage and support nursing and midwifery research especially in skill acquisition during clinical learning to identify best practices, address gaps in knowledge, and improve patient outcomes.

This study was limited to the factors affecting skill acquisition during clinical learning among preservice Registered Nursing students at a particular university nursing school in Zambia, from the nursing students' perspective; therefore, it is recommended that future studies be extended to other nursing training institutions so that a broader understanding of the factors affecting skill acquisition during clinical learning and generalization of the findings could be done. Furthermore, there would be need to conduct a study on clinical skill acquisition to have basic understanding whether the nursing students acquired skill or not.

Declaration of Interest

The authors hereby declare that this article represents our own work. We further declare that all the sources we have cited have been indicated and acknowledged using complete references.

Author's Contributions

RT was responsible for the study conception and design, data collection and analysis and drafting the manuscript. MKM and NN supervised the research process and made critical revisions to the article.

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Unveiling the Nexus: Vulnerability to Psychological Distress and Childhood Violence among Adolescents in Zimbabwe

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Abstract

Exposure to multiple forms of violence increases the risk of developing psychiatric illnesses such as depression, PTSD, and other mental health problems. Despite this, studies investigating the relationship between psychological distress and childhood violence exposure are limited. This study aimed to estimate the prevalence of childhood violence across psychological distress and examined the association between vulnerability to psychological distress and experiencing childhood violence among Zimbabwean adolescents. Utilizing data from the 2017 Zimbabwe Violence Against Children Survey (ZVACS), a representative household survey of adolescents aged 13 to 19 (n=5344), we employed chisquare tests to determine the prevalence estimates across independent and dependent variables. Additionally, four sets of logistic regression models (both unadjusted and adjusted) were performed to predict significant associations between independent and dependent variables. Prevalence results indicated that among adolescents experiencing moderate-to-severe psychological distress, 35.3% had experienced childhood physical violence, 27.2% emotional violence, 15% sexual violence, and 51.2% had been exposed to multiple forms of violence. Similarly, regression results indicated that adolescents with moderate-to-severe psychological distress had higher odds of experiencing childhood physical violence (aOR=2.13), emotional violence (aOR=3.69), sexual violence (aOR=1.93), and multiple forms of violence (aOR=2.59) compared to their counterparts without psychological distress in the past 30 days. These findings underscore the need for interventions that prioritize education and increased access to mental health treatment programs. Moreover, addressing evolving cultural norms and enforcing existing legislation to curb violence are crucial steps to mitigate the risk of further victimization in Zimbabwe.

Keywords: *Psychological distress, emotional violence, sexual violence, physical violence, childhood, adolescence, Zimbabwe.*

Introduction

Mental health disorders significantly contribute to global ill-health and disability. According to the World Health Organization (WHO), approximately one out of every four individuals worldwide encounter mental disorders during their lifetime, affecting around 450 million people globally [1]. Simultaneously, recognizing violence as a health concern is rooted in an understanding that violent behavior stems from various factors such as context, biology, environment, systems, and social stressors [2]. Exposure to violence also plays a role in the development of psychiatric illnesses, including depression, post-traumatic stress disorder, and other forms of psychological distress [3]. However, a "trauma-informed" approach contends that violence is not indicative of inherent moral flaws but rather an adverse health outcome resulting from exposure to multiple risk factors, including psychological

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distress [4]. Within the spectrum of mental disorders, psychological distress emerges as a prevalent form—a nonspecific mental health condition characterized by anxiety, depression, and somatic symptoms that encompass sensations of vulnerability, sadness, fear, extensive worries, restlessness, negative thoughts, and social isolation [5].

The domain of mental health conditions, inclusive of psychological distress, poses a public health challenge that significantly impacts the daily lives of adolescents. This impact extends to their academic and occupational performance, relationships with family and friends, and participation in the community and possible exposure to multiple forms of violence [6].

Childhood violence from both familiar perpetrators and strangers occurs at homes, schools, communities and even online in the form of physical, emotional, and sexual violence [7].

On a regular basis, about 80% of children as young as two years are violently disciplined in low- and middle-income countries (LMICs) resulting in a considerable continuity from childhood aggression to juvenile violence that eventually predicts many violent offenses in adolescence and young adulthood [8-10].

Recent studies underscore the prevalence of psychological distress among adolescents in LMICs [11, 12]. In Zimbabwe, there is a 63.9% prevalence of physical violence before 18 years of age among girls perpetrated by a parent or adult relative and 76% among boys respectively [13]. Unveiling the nexus of childhood violence and examining its global patterns among adolescents aged 13 – 19 years in Zimbabwe remains a priority public health endeavor to protect them from re-traumatization.

To get started, we examine the literature focusing on the relationship between psychological distress on physical, emotional, and sexual childhood violence experiences in different contexts.

Psychological Distress and Childhood Physical Violence

Childhood physical violence is characterized by bruises, scars, burns, and dislocation sustained from abuse, with occasional long-term negative consequences such as permanent scarring, disabilities, recurrent illness, and body deformations [14, 15]. Previous studies have documented the intersection of physical violence against children and psychological distress in the form of suicidal tendencies, memory loss, brain damage and other mental disorders which illustrate the severity of childhood violence [16, 17]. The lasting effect of childhood abuse may materialize in future adolescent health considering the strong relationship between abuse and obesity, sexually transmitted disease, chronic pain, and depression [18-20]. Similarly, when compared against educational outcomes such as years of school completed, performance, attendance, progress, dropout, and post-school education; significant adverse impact of childhood violence on childhood educational attainment such as absenteeism, low performance on standardized tests, and poor reading ability has been reported [21-26]. Regardless of age, culture, gender and country of origin, childhood violence is a global public health challenge because of the adverse long-term physical, emotional, behavioral, cognitive, and social consequences they cause to victims [9].

Therefore, promoting a wholesome beginning to life, and freedom from maltreatment and adversity during childhood, is a crucial step in addressing inequities in African countries, including Zimbabwe. Childhood physical violence arises from a combination of social, cultural, economic, and biological factors, affecting societies across Africa [10, 27-30]. These issues contribute significantly to health disparities and social injustice, with those who are socioeconomically disadvantaged facing a higher risk in Africa [19].

Psychological Distress and Childhood Emotional Violence

Emotional violence has been associated with severe negative consequences including self-inflicted harm, engaging in high-risk sexual behaviors, intimate partner violence (IPV), impulsivity, substance abuse, diminished self-esteem, impaired cognitive function, emotional distress, fear, posttraumatic stress disorder (PTSD), thoughts and suicidal ideations [31-33]. Empirical evidence on childhood emotional violence suggests that maltreatment-related outcomes range from no symptom expression to suicide, thus emphasizing the diverse nature of how emotional violence unravels. Self-compassion (positive acceptance of self) has been proposed as a self-regulatory approach to mitigate negative self-directed emotions for adolescents and young adults inundated by prior childhood emotional violence [34]. Self-compassion has contributed to providing a buffer against childhood maltreatment and subsequent challenges in emotional regulation [34, 35].

Psychological Distress and Childhood Sexual Violence

Evidence suggests that before the age of 18, one in three girls in Zimbabwe experience some form of sexual violence which is consistent with the existing high prevalence rates in many eastern and southern African nations [36]. As a result, Zimbabwe currently possesses a comprehensive multi-tiered response platform made up of government and non-government organizations called Victim Friendly System which provides support for survivors of child sexual abuse [37].

However, the intersection of psychological distress and childhood sexual violence is documented among affluent nations suggesting that experiencing childhood abuse potentially leads to mental health issues in adulthood such as substance abuse, suicidal behavior, depression, stress, and increased risk of sexually transmitted infections [38-41].

Purpose of the Study

The evidence from the literature points to exposure to violence as a risk factor for psychological distress and not vice-versa [42]. As such, it is important to know the magnitude of psychological distress among adolescents before initiating and implementing intervention strategies. This study can help understand the implications of psychological distress among adolescents and provide the impetus for policymakers and stakeholders in the health and education sectors to initiate policies needed to institute prevention and control programs that will address mental health issues among adolescents to Zimbabwe. To fulfill the gaps in existing knowledge, the present study estimated the prevalence of experiencing childhood violence and examined the association with vulnerability and psychological distress among adolescents in Zimbabwe. We hypothesize that having psychological distress in the past 30 days will be significantly associated with experiences of childhood violence (i.e., physical, emotional, and sexual violence, or multiple forms of violence) among adolescents in Zimbabwe.

Methods

Study Design and Sampling Procedures

This study utilized the 2017 Zimbabwe Violence Against Children Survey (VACS)—a nationally representative household survey that identified females and males between 13 - 24 years old using a three-stage, cluster-randomized design. In the first stage of selection, 1,000 female enumerated areas (EAs) and 118 male EAs were randomly selected out of 29,365 EAs with a probability proportional to the size of the EAs in terms of households present. In the second selection stage, the survey data collection teams mapped and listed all structures and households in each of the selected EAs. The survey teams then input the total number of eligible households in the EA into a Microsoft access program explicitly developed for VACS household selection. The program randomly

selected 30 households in the EA to administer the survey. In stage three of selection, one eligible participant (female or male, depending on the EA) was randomly selected by a computer program built using CSPro from the list of all eligible participants ages 13-24 years old in each household. The selected participants were then interviewed. To calculate separate male and female prevalence estimates for having experienced violence, the study used a split-sample approach. This means that each EA was assigned as a location to survey either females or males. The split-sample approach, consistent with World Health Organization (WHO) guidelines, served to protect the confidentiality of participants and eliminate the chance that a perpetrator of sexual violence and a victim of the opposite sex in the same community would both be interviewed [43]. This study oversampled females in districts with a higher expected prevalence of HIV among 16- to 24-year-olds (i.e., districts in the Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe, or DREAMS program). The sample size was adjusted for expected nonresponse among selected households. The study was designed to produce reliable estimates, defined as having a relative standard error (RSE) of less than 30%. In the male sample, 3,445 households were surveyed in 118 randomly selected EAs. A total of 803 males completed the individual questionnaire. In the female sample, 29,635 households in 1,000 EAs were surveyed. A total of 7,912 females completed the individual questionnaire. The overall response rates for males and females were 66% and 72 %, respectively [43]. However, in this study only adolescents aged 13 to 19 years were selected, and therefore, this reduced the sample size to 5344 (males =536, and female=4808).

Inclusion Criteria

To be included in the survey, participants must (1) live in a selected household in Zimbabwe, (2) be between 13 -24 years old at the time of the survey, and (3) be fluent in English, Shona, or Ndebele. Survey administration in English, Shona, or Ndebele was consistent with the practice of previous national surveys administered across Zimbabwe. Individuals ages 13–24 were selected as the most appropriate population to better understand childhood violence.

The study relied on this age range because children younger than 13 typically do not have the maturity to be able to answer survey questions, particularly the more complicated questions on potential risk and protective factors. Furthermore, limiting the upper age range to 24 years was intended to help reduce potential recall bias for childhood experiences. It was not possible to administer the survey to youth who could not understand the questions due to cognitive impairment or a significant physical disability (e.g., a hearing or speech impairment) that would preclude their participation. The survey did not include those living or residing in institutions such as hospitals, prisons, nursing homes, and other similar institutions because the VACS was household-based survey [43].

Data Collection Procedures

Interviewers took thorough precautions to ensure privacy during the survey. They conducted the interviews in safe and private locations such as outside, in a public space without risk of interruptions (i.e., a community area, school, or church), or an appropriate place in the home or yard. Before beginning survey work in a new community, the team leaders sought guidance from community leaders to identify community locations where interviews could occur. Interviewers confirmed that participants, parents, and other household members were comfortable with the location of the interviews.

If no private location was available, the interviewers rescheduled for another time while the survey team was still in the community. In addition, the survey used a split-sample design with separate male and female enumeration

areas (EAs). Participants were surveyed by an interviewer of the same sex. Only the interviewer and participant were present during the interview; no one else—including parents/guardians of the minor participants or other minors in the household—was allowed to listen in. The length of participant interviews varied, ranging from 20 to 60 minutes [43].

Measures

Dependent Variables

Childhood emotional violence. The respondents were asked whether he/she was told as a child by the caregiver that (1) the respondent was not loved or did not deserve to be loved, (2) wished the respondent had never been born or were dead, and (3) the respondent was ridiculed or put down, e.g., say that he/she was useless or stupid before the age of 18. The response categories were never, once, a few times, many times, and don't know/declined. This variable was recoded and dichotomized as 0=no (didn't experience any emotional violence), and 1= yes (experienced any emotional violence; at least once, a few times, or many times).

Childhood physical violence. The respondents were asked (a perpetrator type) has ever been (1) punched, kicked, whipped, beaten with an object, (2) choked, smothered, tried to be drowned, or burned intentionally, (3) threatened with knife or other weapons, which were experienced prior to age 18. The response categories were yes, no, and don't know/declined. The respondents were asked these three questions for each type of perpetrator: (1) intimate partner, (2) peers, (3) parents, adult caregivers, or other adults relatives, (4) and adults in the neighborhood. This was categorized as 0= no (didn't experience any physical violence) and 1=yes (experienced any physical violence).

Childhood sexual violence. Participants were asked whether they had ever: (1) received food, favors, or any gifts in exchange for sex, (2) participated in a sex video or photo, or being shown his/her sexual body parts in front of the webcam, (3) unwanted touching in a sexual way, including fondling, pinching, grabbing, or touching on or around his/her sexual body parts, (4) unwanted sexual attempts in which the perpetrator tried to make the respondent to have sex against his/her will but did not succeed, (5) physically forced sex in which the respondent was forced to have sex, and (6) pressured sex in which the respondent was pressured to have sex through harassment, threats, or tricks. Sexual violence experiences before the age of 18 years were included. The response categories were coded as "yes," "no," and "don't know/declined." The final variable was dichotomously coded as 0=no (didn't experience sexual violence) and 1 =yes (experienced sexual violence).

Exposure to multiple childhood violence. This was assessed by summing up a score for anyone who responded to have experienced childhood emotional violence, physical violence, and sexual violence. A summative scale of cumulative childhood violence was coded as a continuous variable with a range of 0 (no to any emotional, physical, and sexual violence) to 3 (yes to have any emotional, physical, and sexual violence). Finally, this was dichotomously coded as 0=no (no exposure to any violence) and 1=yes (exposure to any violence) for the final analysis.

Independent Variable

Psychological distress was assessed using the Kessler-6 (k-6) non-specific psychological scale [44-46] which consists of six items asking respondents about symptoms associated with depression and/or anxiety in the past 30 days, how often they feel: (1) nervous, (2) hopeless, (3) restless, (4) so sad that nothing could cheer you up, (5) that everything was effortless, and (6) feel worthless about everything [44-46],. Each specific question response included a 5-point Likert-type scale ranging from 0 = none of the time to 4= all the time, with a score ranging from 0 to 24. The sum of these six items were

used to calculate an overall psychological distress score.

Based on the reliability and valid scale and clinically proven cut-off points of Kessler-6 in measuring psychological distress in various contexts, including low-income countries, particularly in Sub-Saharan Africa, demonstrated moderate psychometric properties [44-46]. In the absence of a pre-established cut-off score, we used the cut-off score based on the previous studies [42, 46-47]. Respondents with scores of 0 to 4 were categorized as "0= no psychological distress" and respondents with scores of 5 to 24 were categorized as "1= moderate to severe psychological distress".

Covariates

Data were collected on sociodemographic characteristics that were used as covariates including gender (male or female), age group (0 = 0 -17 years, 1= 18 to 19 years), highest level of education (less than primary, primary, secondary, or higher than secondary), closeness to biological parents (not close to biological parents, and close to biological parents), number of close friends (none, at least one, two or more, and being orphaned prior to 18 years old.

Data Analysis

SPSS vs.29.0 was utilized to perfume all the statistical analyses in this study. Descriptive characteristics were obtained using frequencies and percentages across all the variables. Chi-square tests were used to determine the association and prevalence estimates across all the independent and dependent variables. At the multivariate level, four sets of logistic regression models (unadjusted and adjusted) were performed to determine the significant association between independent and dependent variables. In each regression model, ran both the unadjusted and adjusted regression. For adjusted regression we controlled for covariates (i.e., gender, age, education, closeness to biological parents, number of friends, and being orphaned). Multicollinearity was checked to ensure parsimonious models. A significance level of a=.05 was used to determine statistical significance during data analysis.

Ethical Considerations

The Zimbabwe 2017 VACS adhered to WHO recommendations on ethics and safety in studies of violence against children. The Medical Research Council of Zimbabwe, the Research Council of Zimbabwe (RCZ), and the Centers for Disease Control and Prevention (CDC) Institutional Review Board (IRB) independently reviewed and approved the survey protocol to ensure appropriate protections for the rights and welfare of human research participants. The survey protocol and informed consent documents were reviewed and approved by the U.S. CDC and the Zimbabwe Ministry of Health and Childcare [48]. In addition, the author(s) obtained permission to use the VACS from CDC, which was approved on April 28th, 2023. The IRB at Lewis University exempted this study from full review due to the secondary nature of this study.

Results

Descriptive Characteristics of the Participants

The descriptive characteristics of adolescents are shown in Table 1. Most of the adolescents were females (90.0%), were close to their biological parents (93.9%), aged 13 to 17 years (71.0%), and had completed at least secondary education or higher (64.7%). Less than half the adolescents had at least two or more friends (45.0%), and nearly one-third of the adolescents were orphaned (32.0%). Regarding childhood violence experiences, 12.2% of the adolescents reported having experienced childhood emotional violence, 23.4% physical violence, 8.0% sexual violence, and 32.1% reported having experienced multiple forms of violence (i.e., physical, emotional, or sexual violence). Finally, 23.6% of the adolescents reported having moderate-to-severe psychological distress in the past 30 days.

Table 1. Descriptive Characteristics of Adolescents (n=5344)

Descriptive Characteristics	**N**	**%**
Gender		
Male	536	10.0
Female	4808	90.0
Age (years)		
13-17	3793	71.0
18-19	1551	29.0
Highest education completed		
Primary or less than primary	702	35.3
Secondary or more than secondary	1288	64.7
Closeness to biological parents		
Not close to biological parents	316	6.1
Close to biological parents	4879	93.9
Number of friends		
None	816	15.3
1	2125	39.8
2 or more	2403	45.0
Orphan status		
Non-orphan	3444	68.0
Orphaned	1618	32.0
Experiences of Childhood Violence	**N**	**%**
Childhood emotional violence		
No	4670	87.8
Yes	649	12.2
Childhood physical violence		
No	4090	76.6
Yes	1252	23.4
Childhood sexual violence		
No	4914	92.0
Yes	425	8.0
Multiple childhood violence		
No	3628	67.9
Yes	1714	32.1
Psychological distress (Kesler 6), past 30 days	**N**	**%**
No psychological distress	4079	76.4
Moderate/severe distress	1257	23.6

The Prevalence of Experiencing Childhood Violence across Psychological Distress

The prevalence of childhood violence experiences for adolescents with psychological distress are shown in Table 2. About 35.3% of the adolescents with moderate-to-severe psychological distress had higher rates of having experienced childhood physical violence compared to 19.8% who did not have psychological distress in the past 30 days

(p<.001). Similarly, 27.2% of the adolescents with moderate-to-severe psychological distress reported having experienced childhood emotional violence compared to 7.6% with no psychological distress in the past 30 days (p <.001). Furthermore, 15% of the adolescents with moderate-to-severe psychological distress reported having experienced childhood sexual violence relative to 5.8% with no psychological distress in the past 30 days (p <.001). Finally, 51.2% of adolescents with moderate-to-severe psychological distress reported having experienced multiple forms of violence compared to 26.2% with no psychological distress in the past 30 days (p <.001).

Table 2. The Prevalence of Childhood Violence among Adolescent with Psychological Distress (n=5344)

Variables	**Logistic Regression Models**			
	No	**Yes**	**Total (%)**	**P-value**
Psychological distress (past 30 days)	N (%)	N (%)		
Experienced childhood physical violence				
No psychological distress	3271 (80.2)	808 (19.8)	4079 (76.4)	<.001
Moderate/severe psychological distress	813 (64.7)	444 (35.3)	1257 (23.6)	
Experienced childhood emotional violence				
No psychological distress	3759 (92.4)	309 (7.6)	4068 (76.6	<.001
Moderate/severe psychological distress	907 (72.8)	339 (27.2)	1246 (23.4)	
Experienced childhood sexual violence				
No psychological distress	3841 (94.2)	237 (5.8)	4078 (76.5)	<.001
Moderate/severe psychological distress	1068 (85.0)	188 (15.0)	1256 (23.5)	
Experienced multiple childhood violence				
No psychological distress	3010 (73.8)	1069 (26.2)	4079 (76.4)	<.001
Moderate/severe psychological distress	613 (48.8)	644 (51.2)	1257 (23.6)	

Association between Psychological Distress and Experiencing Childhood Violence

The results of the association between psychological distress and childhood violence experiences among adolescents for both unadjusted and adjusted logistic regression are shown in Table 3. The results showed that adolescents with moderate-to-severe psychological distress were more likely to report having experienced childhood physical violence (aOR=2.13, 95% CI=1.69-2.68), emotional violence (aOR=3.69, 95% CI=2.80 - 4.87), and sexual violence (aOR=1.93, 95% CI=1.44 - 2.60) compared to those with no psychological distress in the past 30 days. Additionally, adolescents with moderate-to-severe psychological distress were significantly associated with higher odds of reporting having experienced any form of violence in childhood (aOR=2.59, 95% CI=2.10 - 3.20).

Table 3. Association between Psychological Distress and Childhood Violence Experiences

No.	**Independent Variables**	**Outcome Variables**	
Model 1	**Childhood physical violence**		
	Psychological distress (past 30 days)	OR (95% CI)	aOR (95% CI)
	No psychological distress(ref.)	Ref	Ref
	Moderate/severe psychological distress	2.21 (1.92 – 2.54)***	2.13 (1.69 – 2.68)***
Model 2	**Childhood emotional violence**		
	Psychological distress (past 30 days)	OR (95% CI)	aOR (95% CI)

	No psychological distress(ref.)	Ref	Ref
	Moderate/severe psychological distress	4.55 (3.84 – 5.39)***	3.69 (2.80 – 4.87)***
Model 3	**Childhood sexual violence**		
	Psychological distress (past 30 days)	OR (95% CI)	aOR (95% CI)
	No psychological distress(ref.)	Ref	Ref
	Moderate/severe psychological distress	2.85 (2.33 – 3.50)	1.93 (1.44 – 2.60)***
Model 4	**Multiple childhood experienced**		
	Psychological distress (past 30 days)	OR (95% CI)	aOR (95% CI)
	No psychological distress(ref.)	Ref	Ref
	Moderate/severe psychological distress	2.96 (2.60 – 3.37)	2.59 (2.10 – 3.20)***

***=P<.001, **=p<.01, *=p<.05, In each of the models, age, sex, highest education, close to biological parents, number of close friends, orphaned, Ref= reference group, CI= Confidence intervals, aOR = Adjusted Odds Ratio

Discussion

The primary purpose of this study was to estimate the prevalence of experiencing childhood violence and investigate its association with vulnerability to psychological distress among adolescents in Zimbabwe. Initially, 23.6% of the adolescents reported experiencing moderate-to-severe psychological distress in Zimbabwe. Particularly, we observed that adolescents with psychological distress reported higher rates of experiencing multiple forms of violence (51.2%), physical violence (35.3%), emotional violence (27.2%), and childhood sexual violence (15%) during childhood. Given the consistent linkage to previous studies between violence exposure and mental health problem for adolescents [49, 50], this study has also provided evidence suggesting that increasing vulnerability to psychological distress is one of the potential risk factors that heightens susceptibility to exposure to a wide range of violence, specifically among adolescents in Zimbabwe.

Therefore, it is vital to provide mental health interventions to mitigate the negative effects of psychological distress that expose adolescents to different forms of violence in their social environment.

Mental health difficulties may stem from past experiences of traumatic experiences, including exploitation or violence. The enduring impacts of experiencing violence among adolescents can heighten their vulnerability to further exploitation [51]. In the present study, we found that adolescents with psychological distress were associated with higher odds of experiencing childhood physical violence among adolescents, aligning with findings in prior studies [16, 17]. This may suggest that the presence of psychological challenges often correlates with challenging behaviors that may provoke irritations, resulting in a physical response expressed in the form of physical violence. At the same time, adolescents grappling with moderate-to-severe psychological distress may lack effective coping mechanisms and the ability to gain control of their own lives. As a result, adolescents may become victims of violence from other people within their homes and communities due to expressions of frustration and anger. Additionally, adolescents with mental health issues may become targets of bullying, further escalating the risk of exposure to physical violence. Therefore, interventions should prioritize education and awareness in various settings such as homes, schools, and social environments, teaching practical ways to respond to individuals with psychological distress to prevent further victimization.

Mental health difficulties can impact individuals' thoughts, feelings, actions, behaviors, and personality. Individuals experiencing mental health challenges may seek or become dependent on others to provide

emotional or practical support [52]. Caregivers, relatives, and other individuals encountered by victims may exploit this relationship of trust and dependency to abuse or exploit adolescents with psychological distress [53]. In the current study, evidence suggested that adolescents with moderate-to-severe psychological distress were 3.7 times more likely to have experienced emotional violence during their childhood. Like physical violence, having psychological distress may predispose adolescents to emotional violence, which may also manifest as a response to specific behaviors, especially when faced with severe frustration and anger from individuals close to the victim.

Henceforth, interventions should promote empathic response and awareness of mental health education, particularly for adolescents, is essential as a mechanism for mitigating emotional violence, which is currently evidenced in this study.

The most recent study suggested that societal factors including stigmatization of mental health issues and societal norms that perpetuate power imbalances, can contribute to an environment where sexual violence is more likely to occur [54]. Like this study, we found that adolescents with moderate-to-severe psychological distress were more likely to report experiencing childhood sexual violence compared to those without psychological distress. It is plausible that having mental health problems increases the risk of vulnerability to sexual violence, and perpetrators may exploit this vulnerability to abuse the victims potentially sexually. While the impact of sexual violence is complex and varies among individuals, factors such as the survivor's support system, coping mechanisms, and access to mental health services can influence the severity of psychological distress. Seeking professional help from therapists, counselors, or support groups is crucial for survivors to address and manage the psychological consequences that may lead to sexual victimization for adolescents in Zimbabwe.

Finally, this study provided evidence by suggesting that adolescents with moderate-to-severe psychological distress were more likely to have experienced multiple forms of violence during childhood. Given that psychological distress may attract specific behaviors that often provoke physical, emotional, or sexual violence among victims, this supports our hypothesis. Therefore, potential interventions should focus on enhancing access to mental health treatment and raising awareness to reduce stigma, diminishing violence perpetration among adolescents who could be potential victims of exposure to physical, emotional, and sexual violence. Additionally, rigorous efforts should be geared toward addressing changing cultural norms, implementing, and reinforcing existing legislation to prevent violence, and providing mental health treatment for adolescents with psychological distress to avoid further potential victimization for adolescents in Zimbabwe.

Study Limitations

The current study has several limitations worth highlighting. This study was cross-sectional, making it impossible to establish causal inferences. Talking about sexual or physical violence and mental health problems are highly emotional and sensitive subjects, creating barriers to disclosing important information due to fear, harassment, or other underlying factors. Since this study was conducted in households, it was impossible to gather information from participants who lived outside of family care and may not represent the entire population. Psychological distress was measured only for the past 30 days, which further limited our understanding of how participants may have experienced psychological distress immediately or months after a particular victimization experience. Despite the limitations, there are strengths as well worth highlighting. The present study was drawn from the nationally representative ZVACS with a large sample size, allowing for

the generalizability of the findings to other settings in LMICs.

Conclusions

This study has established that adolescents with moderate-to-severe psychological distress were associated with higher odds of experiencing childhood violence, including physical, emotional, and sexual violence, along with cumulative exposure in Zimbabwe. To mitigate these issues, interventions must emphasize promoting accessibility to mental health treatment. Prioritizing education and awareness across diverse settings, including homes, schools, and social environments, is crucial in preventing future victimization by violence. Furthermore, substantial efforts are required to address evolving cultural norms, enforce existing legislation to curb violence and deliver mental health treatment for distressed adolescents, mitigating the risk of further victimization in Zimbabwe.

Conflict of Interest

Author declares that there is no conflict of Interest.

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The Essence of Monitoring and Evaluation Systems for Good Governance of Catholic Institutions in Zambia

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Abstract

Monitoring and evaluation (M&E) are a process that involves collecting and analysing data to measure progress toward achieving specific goals and objectives. This process helps organisations to identify what is working and what is not and to make informed decisions on how to improve their programs and projects. This paper focuses on the necessity of M&E in Catholic institutions in Zambia, Lusaka in particular. It underscores the fact that there is no good governance in these institutions due to inadequate M&E mechanisms. The only means of M&E are meetings. The research was done in Lusaka District and some parts of Central Province. It was conducted in 7 institutions. The sample size was 257. There were 252 questionnaires which were administered purposively and randomly to those in the first line, middle and top leadership, and management positions, and 5 in-depth interviews were carried out purposively. It identifies the causes of poor governance as inadequate results-based M&E systems, deficient focus on Key Result Areas (KRAs) and Key Performance Indicators (KPIs), and irregular monitoring of institutional activities. The recommendations were that there was need to build capacity in the areas of performance management, stewardship approach to management (good governance), and to enhance M&E systems. Theoretically, the results can be generalised to all Catholic institutions in Zambia.

Keywords: *Catholic Institutions, Good Governance, Key Performance Indicators, Key Result Areas Monitoring and Evaluation, Stewardship.*

Introduction

The Church is not a business, but it does have a stewardship responsibility to ensure that all its resources are used as effectively as possible to carry out God's work on earth. For a variety of reasons, the Church has lagged well behind other organisations, including other non-profits, in its willingness to address this critical issue [1]. Peter Drucker says that nonprofits such as the Church need to be managed for results and performance, not just good intentions; and that organizational skills would be needed [2].

Good governance or good stewardship is a huge challenge in Catholic institutions. This is because Catholic institutions run without proper direction and accountability measures, are devoid of systems of assessment in terms of successes and challenges and are deficient in the means of determining efficiency and effectiveness. One way of addressing this is through M&E. M&E can be conducted using a wide array of tools, methods, and approaches [3]. Key to M&E are KRAs and KPIs [4]. KRAs refers to those areas of a person's job that make the biggest impact on end results and KPIs are a quantifiable measure of performance over time for a specific objective [5].

However, in most Catholic institutions the leadership and management are insufficiently trained in M&E to provide good governance. Therefore, there is work need to equip the laity,

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religious and clergy who are involved in the running of Catholic organizations with tools that would enable them work efficiently and effectively [6].

Literature Review

There are no adequate monitoring and evaluation instruments and systems in Catholic institutions in Lusaka [7]. There is a need for monitoring and vigilance in administrative, economic, and financial matters regarding crucial institutions, offices, and other institutions [8]. The Catholic Bishops in their Strategic Plan (2017-2026) also expressed concern that there were no monitoring and evaluation systems at different levels of the Church [9]. The Strategic Plan for St. Joseph's Parish (2019 - 2023) in Lusaka also notes of the need to strengthen monitoring and evaluation systems, through among others, annual review meetings, midterm reviews, end line/summative evaluation, quarterly reports and devising feedback mechanisms [10]. As such, there is a need to continually monitor and regularly review performance [11]. All this indicates that there was a challenge in monitoring and evaluation mechanisms in Catholic institutions.

Methodology

The philosophy underpinning this study is pragmatism. A pragmatic methodology provides the researcher with the opportunity to utilize a wide range of strategies or multiple methods to answer a research question, as well as different forms of data collection and analysis techniques that are envisioned to ably meet the researcher's needs and purposes to best understand the research questions [12]. Thus, apart from data, method, investigator, and theoretical triangulations, this study was action research as well as a multiple case study of four (4) categories of Catholic institutions.

Sampling and Data Collection

The study was conducted in seven (7) Catholic institutions in Lusaka, and some parts of Central Province. The sample size was 257. There were 252 questionnaires which were administered purposively and randomly to respondents in the first line, middle and top leadership, and management positions, and 5 in-depth interviews were carried out on key informants purposively selected. Of the 252 questionnaires, 198 were answered and received back. This represents an overall response rate of 79% and a failure rate of 21%.

Data Analysis

The type of data analyzed was largely numeric information gathered on scales of instruments and text information recorded and reported during in-depth interviews [13]. Thus, Excel and thematic data analyses were used. Data analysis was determined by the research objectives and research questions. The presentation of data was done using tables because they are simpler to understand.

Results and Discussions of Findings

Monitoring and Evaluation Systems

Table 1 presents the views of respondents on the question: '*Does your institution have a robust results-based M&E system?*

Table 1. Does your Institution have a Robust Results-based M&E System?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	64	25.4	47	47
	Yes	107	42.5	63	100.0
	No response	81	32.1	100.0	-
	Total	252	100.0	-	-

The survey shows that less than half (42.5%) of the respondents affirmed that there was a robust results-based M&E system in Catholic institutions. More than 50% of the respondents had a contrary view. Therefore, most Catholic institutions did not have a robust result-based M&E system.

Systems for Regular Monitoring Institutional Activities

Table 2 presents the observations of the respondents on the question: *'Do you have a system for regular monitoring of institutional activities?'*

Table 2. Do you have a System for Regular Monitoring of Institutional Activities?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	31	12.3	23	23
	Yes	103	40.9	77	100.0
	No response	118	46.8	-	-
	Total	252	100.0	-	-

The data in Table 2 shows that less than half (41%) of the respondents said that there was a system of regular monitoring in most Catholic institutions, while 59% had a contrary view. Moreover, all 5 Key informants (100%) said that monitoring and evaluation was irregular. Furthermore, all 5 key informants (100%) and 46.0% of respondents said that the common means of evaluation were meetings; either quarterly, mid or end of year. Therefore, there was no good governance in Catholic institutions since there was irregular and inadequate M&E systems and the only tools used were meetings.

Practical Implications

Performance management system is any approach for improving management effectiveness of an organization and of employees by means of standard-setting, appraisal, and evaluation [14]. Thus, without performance management in Catholic institutions, it would be very difficult to achieve organizational vision as there would be not benchmarks and targets to aspire for. The monitoring and evaluation process is essential for ensuring that programs and projects are achieving their intended goals and making a positive impact [15].

This means that Catholic institutions provide services in the areas of health, education, spiritual – pastoral and social welfare, but have no way of assessing and knowing whether the intended targets are being met or not.

KRAs and KPIs are very critical to M&E [16]. These are two essential measurable values that assist organizations in evaluating success and progress. Deficiency in KRAs and KPIs in Catholic institutions means that there is no way of measuring the success and progress of these organizations.

Stewardship is the management of whatever a person is entrusted with, not only to preserve but also profitably administer for his master, ultimately for God. Christ proposed the faithful steward as model for the responsible Christian (Lk 12:42, Mt 28: 18, Jn 19:11). For that reason, Catholic institutions should be managed diligently and responsibly.

Recommendations

To address the *essence of monitoring and evaluation systems for good governance of Catholic institutions in Zambia,* there is a need to:

1. Take a stewardship approach to management of Catholic institutions.

2. Build capacity of leaders and managers in the areas of performance management and monitoring and evaluation.
3. Put in place measures, which include KPAs and KPIs, to enhance monitoring and evaluation systems.
4. Use other means of monitoring and evaluations apart from meetings, such as theory of change, logical framework, monitoring and evaluation plan, statistics – open datasets, system data, surveys, interviews and focus groups, and sample size.

Conclusion

Building capacity of leaders and managers in the areas of performance management, enhancing monitoring and evaluation mechanisms, and embracing stewardship approach to management would address the challenges of poor governance in Catholic institutions.

Acknowledgement

The study was conducted in seven (7) Catholic institutions in Lusaka and parts of Central Province:

1. St. Mathias Mulumba Catholic, Bauleni Parish, 2) Bauleni Special Needs Project, 3) Immaculate Secondary School, Ibex, 4) St. Patrick's Secondary School, Kabwata, 5) St. Joseph's Mission Hospital, Nangoma, 6) Assumption of Our Lady, Roman Parish, and 7) Zambia Conference of Catholic Bishops' Secretariat, Kabulonga.
2. Therefore, many thanks are due to the heads of these institutions for the permission to conduct the study and for helping in administering the questionnaires. Appreciation also goes to the staff for the consent to take part in the survey. Gratitude is invaluable also to Mr. Chola Chifukushi, the research assistant who conducted the in-depth interviews.

Conflict of Interest

Though this was both action research as well as a multiple case study, the author has not declared any conflict of interests.

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Differentials in Male Circumcision Prevalence, HIV/AIDS Knowledge and Behavioral Prevention Practices Among Men in Nigeria

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Abstract

Compelling evidence regarding the HIV/AIDS reduction potentials of male circumcision abounds in sub-Saharan Africa, but men aged 15 to 59 years in Nigeria are mostly circumcised already. Yet, Nigeria continues to experience tens of thousands of deaths due to HIV/AIDS yearly, accounting for one of the highest HIV burdens worldwide. Differentials that may account for new HIV infections and high HIV prevalence rates need to be investigated. The purpose of this study was to examine the prevalence of male circumcision and determine the association between HIV/AIDS/STIs knowledge, contraception methods, and HIV prevention behavioral practices amongst men in Nigeria. This study utilized the 2018 Nigeria Demographic and Health Survey (n= 13,311*). Chi-square tests were used to determine the prevalence of male circumcision. Two binary logistic regression models were performed to predict the relationship between independent and dependent variables. The prevalence of male circumcision was higher among men with knowledge of HIV/AIDS (98%) and other STIs (74%), used condoms (70.7%), and only 2.5% of men who sought advice/treatment were circumcised. Further evidence suggested that knowledge of HIV/AIDS was associated with higher odds of consistent condom use (AOR = 2.37; 95% CI =1.12 – 5.02), and knowledge of other STIs was significantly associated with higher odds of seeking advice/treatment for the last STIs (AOR= 3.06; 95% CI = 1.88 – 4.99). This suggests that comprehensive education regarding HIV/AIDS and STIs if prioritized may serve as both a protective and preventive mechanism to achieve HIV epidemic control among men in Nigeria.*

Keywords: *Circumcised men, HIV/AIDS, HIV/AIDS knowledge, Sexually Transmitted Infections, Sexual behaviors, Nigeria.*

Introduction

Africa has the highest HIV prevalence rate globally, averaging nearly 4% of their population [1]. The World Health Organization (WHO) recommended male circumcision and HIV testing to become part of a comprehensive approach to HIV prevention [2]. Circumcision is a longstanding tradition involving the surgical removal of the foreskin from the penis [3-5]. The suggestion stemmed from findings in three randomized controlled trials (RCTs) carried out in Kenya, South Africa, and Uganda during the early to mid-2000s. These trials demonstrated a 50–60% decrease in the risk of female-to-male transmission of HIV among circumcised men when compared to their non-circumcised counterparts [6-8]. Additional evidence indicates that circumcision is associated with a decrease in HIV infection in some eastern and southern African countries where the public health policies have integrated voluntary male medical circumcision and HIV testing [9-11]. Studies suggests that 75 to 85% of HIV infection are likely acquired through sexual intercourse and majority of men living with HIV might have been infected through the penis [12]. Therefore,

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circumcision could eliminate the inner layer of foreskin enriched with HIV-1 target cells and receptors for the HIV virus [12-15]. This removal may confer protective effects against HIV infections. Both epidemiological and biological studies offer compelling evidence supporting the protective benefits of male circumcision in reducing heterosexual HIV transmission among males. These studies also help to explain the notable geographical variations in the prevalence of HIV infection within sub-Saharan Africa. The increasing focus on circumcision practices is also driven by empirical evidence suggesting a lower incidence of certain sexually transmitted infections (STIs) and HIV among circumcised individuals [14, 16, 17]. Some research even suggests that circumcision could reduce the HIV infection rate by up to 70%, marking a significant contribution to public health [18, 19]. Overall, fifteen WHO designated priority countries in Sub-Saharan Africa have implemented the integration of Voluntary male medical circumcision with HIV prevention practices such as HIV testing as a comprehensive HIV prevention strategy with measurable implications on HIV prevalence rates [20]. Experts warn that male circumcision should not replace HIV prevention practices [21].

Nigeria is the most populous country in Africa and the seventh most populous nation in the world. Most recent estimates indicate that more than three million Nigerians live with HIV/AIDS out of an estimated total current population of 223, 804, 632 million people [1, 22]. The HIV burden in Nigeria ranks fourth worldwide but highest in West and Central Africa with alternative conservative estimates suggesting that about 1.8 million people are living with HIV in Nigeria [23, 24]. In 2021, the HIV prevalence in Nigeria reached 1.9 million people averaging 74,000 new HIV infections at a 1.3% adult HIV prevalence rate, with 51,000 deaths attributed to AIDS, encompassing both adults and children [23, 25]. Nigeria unenviably ranks the lowest in life expectancy among countries in the West African sub-region, with HIV mortality significantly contributing to this problem. Currently, Nigeria has to its credit, a unifying national HIV and AIDS strategic framework 2021 – 2025 which plans to increase access to HIV testing services so as to enable 90% of people living with HIV know their status by 2025 [23].

However, Nigeria has not integrated male circumcision and HIV prevention practices as part of its comprehensive health services despite compelling evidence shown in doing so by other countries in the control of the HIV/AIDS pandemic. Apparently, Nigerian health authorities reckon that circumcision rates are already high, and that subsisting national HIV/AIDS framework may be sufficient. The challenge lies in accurately assessing the implementation of this HIV/AIDS framework with a view to quantifying the impact of the thematic areas of focus on reduction of new HIV infection. Granted, the 2018 Nigeria Demographic and Health Survey indicate that male circumcision rate is indeed very high (96.8%) but other reports indicate that new HIV infection rates remain significantly high coupled with the high HIV burden [23]. Given that experts warn that male circumcision should not replace HIV prevention practices [21], and male circumcision rates are already very high, there is crucial need to explore the differentials in the knowledge of AIDS, other sexually transmitted infectious (STIs), contraception methods and their association with selected HIV prevention behaviors among circumcised males in Nigeria. Understanding the health seeking behaviors of circumcised men will provide valuable insight on alternative thematic areas for focusing health education and intervention resources. Previous studies have focused on countries in East, Central and Southern Africa with non-focusing on Nigeria (West Africa), and have been limited to cross-sectional designs, lacking nationally representative outcomes.

Current evidence is lacking in research specifically targeting Nigerian men.

Additionally, there is limited understanding of how knowledge of HIV/AIDS, other STIs, and contraception methods might impact HIV prevention behaviors among men aged 15 to 59 years old in Nigeria who are already circumcised. Therefore, to advance knowledge and address gaps in existing knowledge, this study utilized nationally representative samples of Nigerian men aged 15 to 59 years old to address the following research questions: (1) What are the prevalence rates of male circumcision across knowledge of HIV/AIDS, other STIs, contraception methods, and HIV prevention behavioral practices among Nigerian men? (2) Are there relationships between HIV/AIDS knowledge, other STIs, contraception methods, and HIV prevention behaviors among men in Nigeria?

Methods

Data Source

The 2018 Nigeria National Demographic and Health Survey (NDHS) is a comprehensive, nationally representative sample survey designed that offers current insights into demographic and health trends [26]. The NDHS was conducted by the National Population Commission (NPC), and the Department of Health and Human Services (DHS) Inner City Fund International (ICF) with support from United States Agency for International Development (USAID), Global Fund, Bill and Melinda Gates Foundation, World Health Organization (WHO), and the United Nations Population Fund (UNFPA). Approximately 42,000 households were included in the representative sample. All men aged 15 to 59 residing permanently in the chosen households, as well as temporary visitors who spent the night before the survey in those households, were eligible for interview participation. Data collection for the NDHS took place from August 14 to December 29, 2018. The survey encompassed various topics, including socio-demographic characteristics, awareness and attitudes towards HIV/AIDS and HIV testing, and other health-related issues. The study utilized a male questionnaire to gather information from eligible male participants aged 15 to 59, focusing on modules covering HIV, condom use, aspects of male circumcision, and demographic characteristics.

Sampling Design and Sample Size

This study is based on a secondary dataset known as the 2018 NDHS which marked a significant milestone as it introduced computer-assisted personal interviewing (CAPI) for the first time [26]. This innovative approach facilitated a faster and more efficient provision of data compared to previous survey methodologies. Employing a stratified, two-stage cluster design, the survey utilized enumeration areas (EAs) as the first-stage sampling units. In the second stage, a complete listing of households was conducted in each of the 1,400 selected EAs. A sample size of 13,311 male participants were interviewed for this study. In addition to presenting national estimates, the report provides key indicators for both rural and urban areas, Nigeria's six geopolitical zones, all 36 states, and the Federal Capital Territory (FCT). This extensive survey serves as a valuable resource for understanding and addressing demographic and health issues across the country. Measures were solely derived from the Man's questionnaire of the NDHS which was administered to all men aged 15-59 in the subsample of households selected for the men's survey.

Measures

Male circumcision is measured by asking participants. "Some men are circumcised, that is, the foreskin is completely removed from the penis. Are you circumcised?" This variable was measured dichotomously as "yes" (circumcised) and "no" (uncircumcised). *Knowledge of HIV/AIDS* was assessed by asking the participants: "Now I would like to talk about something else. Have you ever heard of HIV or AIDS? This variable was measured

dichotomously as "yes" (heard of HIV or AIDS) and "no". *Knowledge of any contraceptive method* was measured by asking the participants if they had knowledge of any contraceptive method. This was dichotomously coded as "yes" or "no". *STIs knowledge* was measured by asking participants: "apart from HIV, have you heard about other infections that can be transmitted through sexual contact?" Also, this variable was measured dichotomously as "yes" (Ever heard of other STIs) and "no" (Have never heard of other STIs). *HIV prevention behaviors* was assessed by asking the following items (1) used condom every time they had sex with the most recent partner in the last 12 months, "was a condom used every time you had sexual intercourse with this person in the last 12 months? (2) sought advise/treatment for last sexual infection, "The last time you had a sexually transmitted infection, did you seek any kind of advice or treatment?" This was dichotomously coded as "yes" or "no".

The socio-demographic characteristics included the following variables: region, ethnicity, resident type, age group, marital status, education, employment, wealth status, and religion. These were used as control variables.

Data Analysis

The statistical package for the social sciences (SPSS version 29) were utilized for data analysis. For the descriptive statistics, the frequencies and proportions of socio-demographic variables were computed and tabulated. Chi-square was used to determine the association and prevalence estimates between male circumcision and knowledge of HIV/AIDS, other STIs, contraception methods, and HIV prevention behaviors. To determine whether knowledge of HIV/AIDS, other STIs, and contraception methods predict the sexual health seeking behaviors of Nigerian men aged 15 to 59 years, we conducted multivariate logistic regression while controlling for sociodemographic characteristics. Afterwards the new knowledge of contraception methods variable, knowledge of HIV/AIDS, and STIs were used to fit a logistic regression to predict the odds of practicing either consistent use of condom or seeking for advice/treatment (HIV prevention behaviors). The statistical significance was set at the *p*-value of 0.05.

Ethical Considerations

The NDHS was executed collaboratively by the National Population Commission (NPC) and the Department of Health and Human Services (DHS), and the Inner City Fund International (ICF), receiving support from the United States Agency for International Development (USAID), Global Fund, Bill and Melinda Gates Foundation, World Health Organization (WHO), and the United Nations Population Fund (UNFPA). Questionnaires, based on The DHS Program's standard Demographic and Health Survey (DHS-7) questionnaires, were modified to address population and health issues specific to Nigeria. The survey protocol underwent scrutiny and approval from the National Health Research Ethics Committee of Nigeria (NHREC) and the ICF Institutional Review Board. Upon finalizing the questionnaires in English language, translations into Hausa, Yoruba, and Igbo languages were carried out. The 2018 NDHS utilized computer-assisted personal interviewing (CAPI) for data collection. Authorization to employ the NDHS was obtained from the Department of Health and Human Services (DHS) Inner City Fund International (ICF), securing approval on November 27th, 2023. The study is deemed to have been conducted ethically and in accordance with established guidelines.

Results

Descriptive Characteristics of the Participants

This table (Table 1) provides descriptive characteristics of the participants. The total sample size included 13,311 Nigerian men aged 15 to 59 years. By *region*, the participants were distributed across different regions of the

country, with the highest representation in the Northwest (22.2%), followed by the Northeast (18.4%) and North Central (18.1%). In terms of *ethnicity,* most participants belong to the "Others" category (37.3%) which represents minority tribes, followed by the Hausa/Fulani ethnic group (33.1%), Igbo (16.0%), and Yoruba (13.6%). More than half of the participants (58.6%) lived in rural areas, were between 15 to 34 years old (55.6%) and were married (58.1%). About 63.5% of the participants had at least secondary or higher education, and only 36.2% were currently working, and belonged to the "rich" by wealth status (41.9%). Slightly more than half of the participants identified as belonging to as Islam (50.1%), and the overwhelming majority of the participants were circumcised (96.8%).

Table 1. Descriptive Characteristics of the Participants (n=13,311)

Variables	**N**	**%**
Region		
North Central	2415	18.1
North East	2447	18.4
North West	2960	22.2
South East	1755	13.2
South South	1697	12.7
South West	2037	15.3
Ethnicity		
Hausa/Fulani	4397	33.1
Igbo	2134	16.0
Yoruba	1811	13.6
Others	4969	37.3
Resident Type		
Urban	5506	41.4
Rural	7806	58.6
Age Group (years)		
15 – 34	7388	55.6
35 – 44	3288	24.7
45 – 59	2635	19.8
Marital Status		
Married	7738	58.1
Never married	5105	38.4
Living with partner	280	2.1
Others	188	1.4
Education		
No education	2946	22.1
Primary	1914	14.4
Secondary or higher	8451	63.5
Employment		
Not working	8488	63.8
Currently working	4823	36.2
Wealth Status		
Poor	4874	36.7

Neither poor nor rich	2858	21.5
Rich	5579	41.9
Religion		
Catholic	1587	11.9
Protestant	4948	37.2
Islam	6664	50.1
Traditionalist	95	0.7
Others	17	0.1
Male Circumcised		
Not circumcised	428	3.2
Circumcised	12827	96.8

The Prevalence of Male Circumcision by HIV/AIDS/STI knowledge, Condom use and Seeking Advise/Treatment for Last STI Infection

The Chi-square results showing an association and prevalence of male circumcision by HIV knowledge, condom use, and seeking advice/treatment for last STI infections are shown in Table 2. The results indicated that knowledge of HIV/AIDs, including ever heard *of HIV/AIDS* ($p < .002$), ever heard of other STIs ($p < .001$), as well as seeking advice/treatment for the last STI infection ($p < .001$) were significantly associated with male circumcision. However, consistent condom use in the last 12 months was not significantly associated with male circumcision ($p = .466$). Particularly, 94.8% of the men who reported having ever heard of HIV/AIDS were more likely to be circumcised compared to 5.2% who never heard of HIV/AIDS. Second, 74% of men who had ever heard of STIs were more likely to be circumcised than 26% who had never heard of other STIs. In terms of seeking advice/treatment for the last STI infection, the prevalence of having sought advice/treatment for the last STI infection was only 2.5%, with only minimal difference for male circumcision compared to 2.4% who never sought advice/treatment for the last STI infection. Finally, although consistent condom use was not significantly associated with male circumcision, surprisingly, 70.7% of the men who used condoms during sexual intercourse in the last 12 months were more likely to be circumcised compared to 29.3% who never used condoms during the last 12 months.

Table 2. The Prevalence of Male Circumcision across HIV/AIDS/STIs Knowledge and Prevention

Variable	**Male Circumcision**			**Effect size**
	Circumcised (N=12827)	**Uncircumcised (N=428)**	**P-Values**	
Ever heard of HIV/AIDS				
Yes	12157 (94.8%)	390 (2.9%)	.002	.030
No	668 (5.2%)	38 (0.3%)		
Ever heard of other STIs				
Yes	9497 (74%)	240 (6.7%)	<.001	.120
No	3330 (26%)	188 (1.9%)		
Ever heard of contraceptive methods				
Yes	12157(94.8%)	397 (13.7%)	.001	.026
No	670 (5.2%)	31 (4.4%)		
Consistent Condom use in the last 12 months				
Yes	967 (70.7%)	42 (4.1%)	.466	.033

No	400 (29.3%)	12 (2.9%)		
Sought advise/treatment for last STI infection				
Yes	324 (2.5%)	45 (12.7%)	<.001	.148
No	308 (2.4%)	15 (4.4%)		

Association between HIV/STI Knowledge, Contraceptive Knowledge and Consistent Condom Use and Seeking Advice/Treatment for STI Infection

The logistic regression results of HIV/STI knowledge and method of contraceptive predicting consistent condom use in the last 12 months and seeking advice/treatment for STI infection are shown in Table 3. Men who ever heard of HIV/AIDS had higher odds of consistent condom use with their most recent partner in the last 12 months compared to those who never heard of HIV/AIDS (AOR = 2.37; 95% CI =1.12 – 5.02; $p < .05$). However, having heard of other STIs was not significantly associated with consistent condom use every time among men had sex with the most recent partner in the last 12 months compared to those never heard of other STIs (AOR = .86; 95% CI =.63 – 1.17; $p > 0.05$). On the other, having heard of other STIs was significantly associated with higher odds of seeking advice/treatment for the last STI infection among men (AOR= 3.06; 95% CI = 1.88 – 4.99; $p < .001$). However, having ever heard of HIV/AIDS (AOR= .33; 95% CI = .072 – 1.48; $p > .05$) and knowledge of contraceptive methods (AOR= 2.47; 95% CI = .60 – 10.2; $p > .05$) were not significantly associated with seeking advice/treatment for last STI infection among men in Nigeria.

Table 3. Logistic Regression Model of HIV Prevention Behaviors and Knowledge of HIV/AIDS, Other STIs, and Contraception Methods

Variables	**Model 1**	**Model 2**
	Consistent Condom Use	**Sought Advice and Treatment**
	AOR (95% C.I)	AOR (95% CI)
Ever heard of HIV/AIDS		
Yes	2.37 (1.12 – 5.02)*	.33 (.072 – 1.48)
No	Ref	Ref
Ever heard of STIs		
Yes	.86(.63 – 1.18)	3.06 (1.88-4.99)***
No	Ref	Ref
Contraceptive method knowledge		
Yes	X	2.47 (.60 – 10.2)
No	Ref	Ref

*=*P*<.05, **=*P*<.01, ***P<.001, *AOR = Adjusted Odd Ratio, CI = Confidence Intervals.*

Model 1 used condom is analyzed as an outcome variable, and Model 2 sought advice/treatment is analyzed as an outcome variable, X= Not analyzed due to collinearity between knowledge of contraceptive methods and consistent condom use during the past 12 month.

Discussion

Our aim in this study was to determine the prevalence and examine the differences between HIV/AIDS knowledge, other STIs, contraception methods, and the potential odds of such knowledge impacting the practice of selected HIV prevention behaviors amongst circumcised men in Nigeria. Hence, this study

has made a significant contribution to the literature by providing critical insights about high rates of male circumcision that appear not to result in a commensurate reduction in the HIV prevalence rate and HIV/AIDS burden among Nigerian men.

In particular, in our prevalence findings, we found that among 96.8% of men who were circumcised, 94.8% reported having knowledge of HIV/AIDS, 74% knowing other STIs, 94.8% having knowledge of contraceptives, and 70% reported having used condoms in the past 12 months in Nigeria. At the same time, the significant association we found between reported knowledge of HIV, and consistent condom use with male circumcision is consistent with findings from previous studies indicating a high knowledge of medical circumcision for HIV prevention among male samples in other countries [27-29]. This suggests that knowledge of HIV/AIDS may serve as both a protective and prevention mechanism with numerous benefits of reducing the potential HIV or infection from other STIs among men in Nigeria. Thus, the continuation of intervention or programs in some parts of the country lagging HIV awareness is paramount to successfully control HIV/AIDS infection rates in Nigerian society. In the present study, we found a highly significant association between other STIs and male circumcision status. This aligns with the previous study, which indicated that men who were circumcised, regardless of their HIV status, exhibited a lower prevalence of syphilis compared to their uncircumcised counterparts in Nigeria [30]. Additionally, circumcised men demonstrated a reduced prevalence of curable STIs among their female partners [30]. In contrast, one study conducted in Uganda posits that there was no association between male circumcision and other bacterial STIs with the exception of syphilis and chancre [31]. This study also found that male circumcision was associated with variations in awareness of HIV/AIDS, other STIs, and contraceptive methods, as well as seeking advice/treatment for the last STI infection but not for consistent use of condom for every sexual intercourse in the past 12 months. Similar studies conducted in eastern, southern, and central Africa support this finding [29, 32, 34].

Furthermore, knowledge of AIDS was significantly associated with higher odds of consistent condom use among men in Nigerian. Specifically, those having knowledge of AIDS were 2.4 times more likely to use condoms relative to those who were not aware of AIDS in Nigeria. Conversely, rather than knowledge of AIDS, some prior studies found that perception of condom use by friends, self–efficacy (attitudes toward condom use, obstacles to condom usage, contentment with sexual communication, expected quantity of sexual partners, brief sexual encounters, and ethnic identity), and general impulsive attitudes were predictors of condom use [35-37]. Another study suggests that having more social network members was a significant predictor of consistent condom use [38]. A more recent study found that condom use were reportedly high during anal sex than in vaginal sex [39], while another study identified the predictor for condom use as initiating condom use during one's first sexual experience and engaging in a conversation with one's initial sexual partner regarding the use of condoms [40]. These studies did not specifically examine the knowledge of AIDS in relation to condom use in their sample.

On the other hand, evidence from the current study suggests that knowing other STIs was associated with higher odds of seeking advice/treatment. Precisely, Nigerian men who have heard of other STIs were three times more likely to seek treatment or advice if they had a sexually transmitted infection. Although other studies have suggested that age and number of sexual partners are correlates of HIV and STI status in similar sub-Saharan African demographics [35], this study presents unique differentials in knowledge about other STIs examined through HIV prevention evidence. It is also possible that having knowledge about STIs

could serve as a reminder about the potential consequences that are associated with undiagnosed STIs. As such, men who engage in unprotected sexual risk behaviors may be compelled to seek treatment or advice regarding STIs. In this case, knowledge of STIs is a potential protective factor and can prompt immediate response to seek support, treatment, and information vital to living healthy and productive lives among men at risk of STIs.

Implications of the Study

The findings from this current study present a unique perspective, but like other related studies [35], proposes the crucial need to escalate HIV/AIDS preventive measures in favor of those who are behaviorally vulnerable to HIV/AIDS such as adolescents, young adults and the uneducated who may not have been exposed to family life and HIV education. Sex education have been the thrust of prior studies with similar demographics, although it is not often emphasized in the Nigerian society due to socio-cultural, educational, and religious inhibitions [41-43]. In this sample, 22.1% have no education at all. In comparison, 14.4% have only primary education, which indicates that 36.5% of Nigerian men may likely be uneducated about sexual health beyond knowledge of the existence of HIV/AIDS. Also, young men aged 15 to 34 years who may be most behaviorally vulnerable to HIV/AIDS account for the highest group with the least possibility of sexual health education, assuming they fall within the 36.5% of Nigerian men with little or no education. Given the possibility of the lack of family life and HIV education in the younger demographic prior to potential exposure to sexual risks, more concerted efforts at sexuality education should be prioritized early from 10 years old.

Limitations of the Study

The limitations of the current study include the lack of HIV testing data which may also contribute to understanding the relationships between male circumcision and HIV prevention behaviors. Also, the study design suggests that the current study cannot establish or infer a causal relationship between male circumcision and HIV prevention behaviors or knowledge of HIV/AIDS, contraception, and STIs. Considering that HIV is still a disease rooted in stigma, social and economic inequities, the self-report survey design may be prone to response bias. Participants in the study may have potentially underreported or experienced recall bias, influencing the outcomes. Despite these limitations, our models incorporated variables chosen for their relevance in extensive existing literature, particularly in studies related to male circumcision and HIV. Notably, the study employed a nationally representative sample, enhancing reliability and generalizability to other settings in Nigeria and across sub-Saharan African countries.

Conclusions

This study provides valuable insights on the differentials in HIV/AIDS knowledge and behaviors and male circumcision with the intent to contribute to the HIV prevention literature. Evidence from this study suggests that knowledge of HIV/AIDS is a significant predictor of consistent condom use during sexual intercourse. Similarly, knowledge of STIs is also a significant predictor of seeking advice or treatment following sexual infection. Besides, male circumcision status has been associated with differences in awareness of HIV/AIDS, other STIs, and contraceptive methods, as well as seeking advice/treatment for the last STI infection. These findings provide thematic areas of focus for the national response towards ending HIV/AIDS in Nigeria. Considering that male circumcision status does not account for reduction in HIV burden and prevalence among Nigerian men, concerted efforts should focus on alternative approaches such as expanding access to HIV prevention, treatment, and linkage to care services at the community level through relevant formal and informal community structures. Current efforts addressing HIV prevention in

Nigeria should integrate sexuality education into all existing community health services, focusing on building the knowledge and capacity of community stakeholders and service providers. Moreso, evaluating the progress of the national HIV/AIDS strategy should be carried out quarterly in order to sustain progress in ending the HIV epidemic. Finally, this study provides direction for further studies that could utilize ethnographic qualitative approaches to integrate community engaged HIV prevention strategies such as HIV testing and linkage to care services into research.

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Conflict of Interests

The author(s) declare that they have no competing interests.

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The Prevalence of Sexually Transmitted Infections and Subsequent Association with Exposure to Childhood Violence and Mental Health Outcomes for Adolescents and Young Adults in Zimbabwe

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Abstract

Sexually transmitted infections (STIs) represent a major public health concern for young people in developing nations, impacting approximately two-thirds of individuals below the age of 25. This study examined the prevalence and the association between self-reported STIs, childhood violence exposure, and mental health outcomes among adolescents and young adults (13-24 years old) in Zimbabwe. Secondary data from the 2017 Zimbabwe Violence Against Children and Youth Survey (n=8,715) was utilized. Data analysis was performed using chisquare to determine the prevalence estimates for bivariate. Seven logistic regression models were used to examine the significant association between independent variables and outcomes for multivariate. About 45.5% of adolescents and young adults with self-reported STIs were exposed to multiple forms of childhood violence, 49.8% reported lifetime suicide risk, and 44.9% reported moderate-to-severe mental distress in the past 30 days. Furthermore, logistic regression results indicated that adolescents and young adults with self-reported STI diagnoses were more likely to be exposed to multiple forms of childhood violence, including physical, emotional, and sexual violence, as well as mental distress in the past 30 days and lifetime suicide risk compared to those without STIs. Therefore, this study underscores the importance of implementing comprehensive public health strategies to protect the wellbeing of adolescents and young adults with STIs. Interventions should also prioritize raising awareness, destigmatizing STIs, implementing and strengthening violence prevention policies, and addressing mental health problems through community mental health treatment programs in Zimbabwe.

Keywords: *Childhood violence, Emotional violence, Exposure, Mental distress, Physical violence, Sexual violence, Sexually transmitted infections (STIs), Suicide risk, Zimbabwe.*

Introduction

Sexually transmitted infections (STIs) are the major public health challenges, particularly affecting a large number of young individuals in our society [1]. Despite advancements in detection, treatment, and the widespread acceptance of STI testing, global statistics indicate an increased risk for STIs among individuals aged 13 to 24 [2, 3]. In 2016 alone, there were approximately 376 million recorded cases of STIs among people aged 15 to 49 years old [4, 5]. Young adults engaging in risky sexual behaviors bear the brunt of STIs, with an estimated two-thirds of those under 25 being impacted [6]. The prevalence rate of 18,000 STIs per 100,000 persons presents a substantial public

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health challenge for young people. In Africa, particularly sub-Saharan Africa grapples with an even higher age-standardized incidence rate of STIs with more than 19,000 STIs per 100,000 persons [7]. Zimbabwe, in particular, witnessed a surge in STI cases among young people, with a notable increase of 15,827 cases in 2022 compared to 2021. This surge not only compromises the quality of life for affected young individuals but also places strain on households' resources and national budgets to deal with the increasing risk of STIs [8]. In Zimbabwe, the commonly reported forms of STIs are predominantly gonorrhea and chlamydia, which are often detectable in urethral and vaginal discharge [9]. Also, the STIs often remain asymptomatic or present mild symptoms, posing greater challenges in diagnosis and treatment of the affected individuals [1, 10]. The peak incidence of STIs usually occurs in young adulthood phase, with approximately one-third of reported gonorrhea and chlamydia cases affecting those primarily aged between 20 and 24 years and more than half of STI infections occurs before the age of 25 [11].

Further evidence suggests a connection between the risk of STIs with the exposure to violence, and the development of physical and mental health problems [12]. Previous research has indicated that being exposed to physical, emotional, and sexual violence is strongly linked to adverse health outcomes, increasing the likelihood of contracting STIs [11, 13]. Although, prior studies have shown that experiencing emotional violence entails engaging in harmful behaviors characterized by manipulation, belittlement, undermining, or degrading an individual's emotional well-being and sense of self-worth, leading to significant emotional distress [14-17], there is scarcity of literature showing the direct association between self-reported STIs and emotional violence for adolescents and young adults. Due to enduring stigma and discrimination that is attached to young people diagnosed with STIs, it is possible that adolescents with STIs may be targeted for emotional violence. Other studies have previously found a connection between childhood sexual violence with the later development of STDs and symptoms of mental distress, but not the other way around [18-22]. This relationship may be obvious because most of the STIs are spread through sexual intercourse. However, it remains unknown in many contexts whether those who have been diagnosed with STIs may be target of sexual violence in LMICs.

A limited body of research has shown direct and indirect association between experiencing physical or witnessing violence and health-related outcomes related to sexual risk outcomes, but no direct link between STI and exposure to physical violence [22-25]. A study conducted by London et al., [11] stated that during adolescence, the self-reported prevalence of STIs such as chlamydia, gonorrhea, or trichomoniasis was 1.7%. However, after accounting for other factors, specific traumatic experiences were strongly associated with STIs. For instance, witnessing violence was significantly associated with the traumas linked to STIs [11]. On the other hand, previous studies found a proportional connection between exposure to multiple forms of violence and self-reported STIs for males and females [26, 27]. Several other studies involving adolescents and youth have identified a connection between mental health problems and STIs [28-30]. For example, individuals diagnosed with mental health conditions such as depression were found to be susceptible to contracting STIs [31, 32]. Additionally, a Canadian study revealed that 6.7% of STI patients reported experiencing suicidal thoughts and mental health needs within the preceding 12 months [33].

Finally, although several literatures suggest that being diagnosed with an STI is often associated with stigma and discrimination [34-36], there is a limited understanding of the relationship between having an STI diagnosis and its negative consequences with exposure to multiple forms of childhood violence [37]. This

gap in the existing literature is particularly evident in Zimbabwe. Therefore, this study aims to address these gaps by answering the following questions:

1. *What are the prevalence of self-reported sexually transmitted infections (STIs) in relation to exposure to childhood violence and mental health outcomes among adolescents and young adults in Zimbabwe?*
2. *Is there a relationship between self-reported STIs and mental health outcomes (i.e., suicide risk and mental distress) among adolescents and young adults in Zimbabwe?*
3. *Is there a relationship between self-reported STIs and exposure to childhood violence among adolescents and young adults in Zimbabwe?*

In view of the above research questions and evidence from the prior literature, we hypothesize that adolescents and young adults with self-reported diagnosis of STIs will be more likely to report having experienced childhood violence (i.e., emotional, physical or sexual violence) and mental health problems (i.e., mental distress and suicide ideations or attempts) relative to those without STI diagnosis.

Methods

Study Design and Population

This study employed a cross-sectional design, utilizing secondary data from the 2017 Zimbabwe Violence Against Children Survey (ZVACS). The survey targeted individuals aged 13 to 24 and was designed as a nationally representative household survey [38]. The survey employed a three-stage, cluster-randomized approach. In the first stage, 1,000 female Enumeration Areas (EAs) and 118 male EAs were randomly selected from a total of 29,365 EAs, with selection probability proportional to the size of the EAs in terms of household presence. During the second stage, survey data collection teams mapped and listed all structures and households in the selected EAs. Moving to the third stage, one eligible participant aged 13 to 24 (either male or female based on the EA) was randomly chosen using a computer program built with CSPro. This participant was then interviewed. The study employed a split-sample approach to maintain confidentiality and align with World Health Organization (WHO) guidelines. Each EA was designated to survey either females or males, preventing simultaneous interviews of a sexual violence perpetrator and victim of the opposite sex in the same community. For the male sample, 3,445 individuals were surveyed across 118 randomly selected EAs, with 803 males completing individual questionnaires. In the female sample, 29,635 households in 1,000 EAs were surveyed, resulting in 7,912 females completing individual questionnaires. The response rates were 66% for males and 72% for females, leading to a total sample size of 8,715 participants aged 13 to 24 in Zimbabwe [38].

Inclusion Criteria

Participants included in the survey had to meet the following criteria: (1) must live in a selected household in Zimbabwe, (2) be between 13 and 24 years old at the time of the survey, and (3) be fluent in English, Shona, or Ndebele. Survey administration in these languages was consistent with previous national surveys in Zimbabwe. The chosen age range was deemed appropriate for understanding childhood violence, considering the maturity required to answer survey questions, especially those related to potential risk and protective factors. The upper age limit of 24 aimed to minimize recall bias for childhood experiences. Additionally, individuals with cognitive impairment or significant physical disabilities hindering their understanding of survey questions were not included [38].

Data Collection Procedures

Privacy was a priority during survey administration. Interviewers conducted interviews in safe and private locations such as community areas, schools, churches, or appropriate places within households or yards.

Before initiating survey work in a new community, team leaders sought guidance from community leaders to identify suitable interview locations. Participants, parents, and household members' comfort with the interview location was confirmed by interviewers. If no private location was available, interviews were rescheduled while the survey team remained in the community. Employing a split-sample design with separate male and female EAs, participants were interviewed by an interviewer of the same sex. Only the interviewer and participant were present during the interview, ensuring the privacy of minors. The duration of participant interviews ranged from 20 to 60 minutes [38].

Measures

Dependent Variables

The dependent variables encompassed exposure to multiple forms of childhood violence, such as childhood physical violence, emotional violence, sexual violence, and witnessing physical violence during childhood. These variables were selected based on previous studies utilizing the Violence Against Children Surveys (VACS) [39-41]. The items used in the VACS were derived from validated scales, including the ISPCAN Child Abuse Screening Tool Retrospective, which assessed experiences of physical and sexual violence from any perpetrators [42], and the Juvenile Victimization Questionnaire, which assessed witnessing physical violence [43, 44].

Childhood emotional violence involved respondents indicating whether, as a child, their caregiver had told them that they were not loved, did not deserve love, wished they had never been born, or were ridiculed or put down before the age of 18. Response options ranged from 'never' to 'don't know/declined,' and this variable was dichotomously coded as either 'no' (never experienced emotional violence) or 'yes' (experienced emotional violence).

Childhood physical violence was assessed by asking the respondents whether they had experienced physical violence inflicted by any perpetrator prior to 18 years old: (1) being punched, kicked, whipped, or beaten with an object, (2) being choked, smothered, subjected to drowning attempts, or intentionally burned, and (3) facing the use or threat of a knife or other weapons. The responses were recoded for each type of perpetrator, including (1) intimate partners, (2) peers, (3) parents, adult caregivers, or other adult relatives, and (4) adults in the neighborhood. The response options were 'yes,' 'no,' and 'don't know/declined.' Physical violence was recoded dichotomously as 'yes '(never experienced physical violence) and yes (experienced physical violence).

Childhood sexual violence was assessed by asking the respondents whether they had experienced any sexual violence prior to 18 years old: (1) being offered favors, gifts or food in exchange for engaging in sexual acts, (2) being involved in a sex video or photo or coerced to display their sexual body parts on webcam, (3) experiencing unwanted sexual touching, such as pinching, grabbing, fondling, or touching of their sexual body parts, (4) facing unsuccessful attempts of forced sexual intercourse against their will, (5) being physically forced to engage in sexual acts, and 6) being coerced into sexual acts through harassment, threats, or manipulation. The response options provided were 'yes,' 'no,' and 'don't know/declined.' The responses were subsequently dichotomously coded as 'no' (no exposure to sexual violence) or 'yes' (exposure to sexual violence).

Witnessed childhood physical violence was assessed by asking the respondents whether they had ever heard or seen a parent being punched, kicked, beaten up by the other parent, or their boyfriend or girlfriend before they were 18 years old. The response categories were never, once, a few times, many times, and don't know/declined. The responses were subsequently dichotomously coded as 'no' (never witnessed physical violence), or 'yes' (once, a few times, or many times; witnessed physical violence).

Exposure to multiple forms of childhood violence. This was assessed by summing a total score for anyone who responded to have experienced emotional violence, physical violence, and sexual violence. A summative scale of cumulative any childhood violence was coded as a continuous variable with a range of 0 indicating 'no' (if never experienced any emotional, physical, or sexual violence) to 3 indicating 'yes' (if the respondents experienced any emotional, physical or sexual violence). Finally, this was dichotomously coded as 0=no (no exposure to multiple forms of violence) and 1= 'yes' (exposure to multiple forms of violence) for the final analysis.

Mental distress was assessed using the Kessler-6 (k-6) non-specific psychological scale [45]. Six questions were asked about how often the respondents in the past 30 days felt the following: (1) nervous, (2) hopeless, (3) restless, (4) so sad that nothing could cheer you up, (5) that everything was effortless, and (6) worthless about everything. Based on a 5-point Likert-type scale, each response had a possible score range of 0= none of the time to 4= all the time with a total possible score ranging from 0 to 24. Based on the reliability and valid scale and clinically proven cut-off points of Kessler-6 in measuring psychological distress in various contexts, including LMICs, respondents with scores of 5 to 24 were categorized as having moderate or severe mental distress and respondents with scores of 0 to 4 were categorized as having no mental distress [45].

Suicide risk was assessed by asking the respondents: (1) have you ever had thoughts about killing yourself? (2) have you attempted suicide? and (3) have you tried to kill yourself? The available response options were 'yes,' 'no,' and 'don't know/declined.' Suicide risk was categorized as 0 = no suicide risk or 1= with suicide risk (*suicidal thoughts or attempts)* based on the distribution of the data.

Independent Variable

Sexually transmitted infections (STIs) was assessed by asking participants: (1) have you ever been diagnosed with a sexually transmitted infection?' (2) have you ever been diagnosed with genital ulcers? These two items were summed up for a total score and were dichotomously coded as 'no' (if the respondents reported no STI diagnosis) and 'yes' (if the respondents reported to have been diagnosed with STIs).

Control Variables

Sociodemographic characteristics such as sex, age, highest level of education completed, marital status, and being close to biological parents were included as control variables in the sample.

Data Analysis

Descriptive characteristics were conducted using frequencies and percentages, considering the categorical nature of the variables. Chisquare analysis was conducted to derive weighted frequencies and percentages (prevalence estimates), establishing significant associations for bivariate analysis. Additionally, seven logistic regression models were employed to determine the significant associations between the primary independent variable (self-reported STIs) and seven dependent variables (multiple exposures to childhood violence, sexual violence, emotional violence, physical violence, witnessing physical violence, mental distress, and suicide risk), while controlling for sociodemographic characteristics in the sample. A significant level of 0.05 was applied to both bivariate and multivariate analyses, with SPSS version 29.0 used for statistical data analysis.

Ethical Considerations

This study employed secondary data that was not subject to ethical clearance from Lewis University. The survey protocol and informed consent documents underwent scrutiny and received approval from both the U.S. Center for Disease Control and Prevention (CDC) and the Zimbabwe Ministry of Health and Childcare during the initial survey [46].

Results

The Descriptive Characteristics of the Participants

Table 2 below shows the descriptive characteristics of the participants in the sample. Out of 8,715 participants, 43.5% were male, 56.5% were young adults (18-24 years), 72.2% completed at least secondary or higher levels of education, 68.0% were never married, and 94.0% were close to their biological parents (94.0%). Additionally, 28.9% of the participants were exposed to multiple forms of childhood violence, 20.5% experienced childhood physical violence, 75.6% experienced childhood emotional violence, 7.6% experienced childhood sexual violence, and 28.1% witnessed physical violence in childhood. On the other hand, 28.5% of the participants reported moderate/severe mental distress in the past 30 days, and 31.8% reported suicidal thoughts or attempted suicide during their lifetime.

Table 1. The Descriptive Characteristics of the Participants (n=8715)

Variables	**N**	**%**
Sex		
Male	5124	43.5
Female	3567	41.0
Age (years)		
13-17	3793	43.5
18-24	4922	56.5
Highest education completed		
Primary or less	1389	27.8
Secondary or higher	3602	72.2
Marital status		
Never married	5925	68.0
Married	2787	32.0
Close to biological parents		
No	506	6.0
Yes	7951	94.0
Exposure to multiple childhood violence		
No	6199	71.1
Yes	2516	28.9
Childhood physical violence		
No	6930	79.5
Yes	1782	20.5
Childhood emotional violence		
No	223	24.4
Yes	690	75.6
Childhood sexual violence		
No	8052	92.4

Yes	658	7.6
Witnessed physical violence		
No	2943	71.9
Yes	1148	28.1
Mental distress (past 30 days)		
No mental distress	6229	71.5
Moderate or severe mental distress	2478	28.5
Lifetime suicide risk		
No suicide risk	5938	68.2
Suicidal thoughts or attempts	2772	31.8

The Prevalence of Self-Reported STIs Across Childhood Violence and Mental Health Outcomes

Table 2 shows the prevalence of self-reported STIs across multiple forms of childhood violence and mental health outcomes. Participants who experienced childhood sexual violence had a higher STI prevalence rate of 12.3%. Additionally, those who witnessed physical violence in childhood, experienced childhood physical violence, experienced emotional violence, and were exposed to multiple forms of violence during childhood exhibited STI prevalence rates of 9.9%, 8.7%, 8.6%, and 8.5%, respectively. In contrast, 9.1% of participants who reported moderate/severe mental distress in the past 30 days, and 9.1% who had suicidal thoughts or attempted suicide reported a diagnosis of STIs during their lifetime.

Table 2. The Prevalence of STIs Across Childhood Violence and Mental Health Outcomes

Variables	**No STIs**	**With STIs**	**Total**
	N (%)	**N (%)**	
Exposure to multiple childhood violence* **			
No	5901 (95.3)	290 (4.7)	6191
Yes	2297 (91.5)	214 (8.5)	2511
Experienced childhood physical violence* **			
No	6575 (95.0)	349 (5.0)	6924
Yes	1622 (91.3)	155 (8.7)	1777
Experienced childhood emotional violence* **			
No	205 (92.3)	17 (7.7)	222
Yes	630 (91.4)	59 (8.6)	689
Experienced childhood sexual violence* **			
No	7620 (94.7)	423 (5.3)	8043
Yes	576 (87.7)	81 (12.3)	657
Witnessed physical violence in childhood* **			
No	2785 (94.7)	155 (5.3)	2940
Yes	1033 (90.1)	113 (9.9)	1146
Mental distress (past 30 days)* **			
No mental distress	5946 (95.5)	277 (4.5)	6223
Moderate or severe mental distress	2249 (90.9)	226 (9.1)	2475
Lifetime suicide risk * **			

No suicide risk	5679 (95.7)	253 (4.3)	5932
Suicidal thoughts or attempts	2518 (90.9)	251 (9.1)	2769

Note: Chi-square tests were used to calculate the prevalence estimates. *= p <.05, **= p<.01, ***p<.001

The Prevalence of Childhood Violence and Mental Health Outcomes Across STIs

Table 3 shows the prevalence of childhood violence and mental health outcomes across self-reported STIs. Among the participants with self-reported STIs, 42.5% were exposed to multiple forms of childhood violence, 30.8% experienced childhood physical violence, 75.4% experienced childhood emotional violence, 16.1% experienced childhood sexual violence, and 42.2% witnessed physical violence in childhood, 44.9% had moderate/severe mental distress in the past 30 days, and 49.9% lifetime suicidal thoughts or attempted suicide.

Association Between Self-Reported STIs and Childhood Violence

Table 4 shows the logistic regression results between self-reported STIs and exposure to childhood violence. Participants with self-reported STIs were more likely to be exposed to multiple forms of childhood violence (AOR=1.77, 95% CI=1.41-2.23), experienced childhood physical violence (AOR=1.78, 95% CI=1.38-2.28), experienced childhood sexual violence (AOR=2.26, 95% CI=1.67—3.05), and witnessed physical violence during childhood (AOR=1.69, 95% CI=1.35-2.11) compared to those without self-reported STIs. Despite this, self-reported STIs was not significantly associated with experiencing childhood emotional violence among the participants in the sample.

Association Between Self-Reported STIs and Mental Health Outcomes

Table 5 shows the results of an association between self-reported STIs and mental health outcomes (i.e., mental distress and suicide risk). Participants who reported STIs diagnosis were more likely to report moderate/severe mental distress in the past 30 days compared to those without STIs (AOR=1.69, 95% CI=1.35-2.11). On the other hand, participants who reported STIs were more likely to report having suicidal thoughts or attempted suicide during their lifetime compared to those without STIs (AOR=1.77, 95% CI=1.42-2.21).

Table 3. The Prevalence of Childhood Violence and Mental Health Across Self-reported STI

Variables	Multiple childhood violence	Experienced PV	Experienced EV	Experienced SV	Witnessed PV	Mental Distress	Suicide Risk
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
STIs							
No	2297 (28.0)***	1622 (19.8)***	205 (24.6)	576 (7.0)***	1033 (27.1)***	2249 (27.4)***	2518 (30.7)***
Yes	214 (42.5)***	155 (30.8)***	630 (75.4)	81 (16.1)***	113 (42.2)***	226 (44.9)***	251 (49.8)***

Note: Sample sizes are different for each outcome based on recorded responses. Chi-square tests (cross tabulations) were used to calculate the prevalence estimates. *= p <.05, **= p<.01, ***p<.001. STI = Sexually transmitted infections, PV=physical violence, and SV=sexual violence, and EV= emotional violence

Table 4. Association of Self-Reported STIs with Childhood Violence Types

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
	Multiple forms of violence	Experienced PV	Experienced EV	Experienced SV	Witnessed PV
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Sex					
Male	Ref	Ref	Ref		
Female	1.07 (0.94—1.22)	1.03 (0.89—1.20)	0.92 (0.59 –1.43)	1.00 (0.81—1.23)	1.12 (0.99—1.27)
Age (years)					
13 - 17	Ref	Ref	Ref	Ref	Ref
18 - 24	0.54 (0.46—0.65)***	0.52 (0.43—0.63)***	1.36 (0.81—2.27)	0.58 (0.43—0.75)***	1.43 (1.19—1.72)***
Marital status					
Never married	Ref	Ref	Ref	Ref	Ref
Married	1.22 (1.06—1.40)***	1.17 (1.00—1.38)	0.77 (0.48—1.25)	1.66 (1.32—2.09)***	1.13 (0.99—1.28)
Highest education completed					
Primary or less than primary	Ref	Ref	Ref	Ref	Ref
Secondary education or higher	0.93 (0.80—1.08)	0.88 (0.74—1.03)	1.29 (0.82—2.02)	0.96 (0.77—1.21)	1.00 (0.87—1.16)***
Close to biological parents					
No	Ref	Ref	Ref	Ref	Ref
Yes	0.54 (0.43—0.69)***	0.69 (0.53—0.90)***	0.55 (0.27--1.13)	0.67 (0.47—0.95)*	0.58 (0.46—0.73)***
Self-reported STIs					
No	Ref	Ref	Ref	Ref	Ref
Yes	1.77 (1.41—2.23)***	1.78 (1.38—2.28)***	1.26 (0.58—2.73)	2.26 (1.67—3.05)***	1.69 (1.35—2.11)***

*= p <.05, **= p<.01, ***p<.001. STI = Sexually transmitted infections, PV=physical violence, and SV=sexual violence, and EV= emotional violence, AOR = adjusted odd ratios

Table 5. Association of Self-reported STIs with Mental Health Outcomes

Variables	Model 1	Model 2
	Mental distress (past 30 days)	Suicide Risk (lifetime)
	AOR (95% CI)	AOR (95% CI)
Sex		
Male	Ref	Ref
Female	1.12 (0.99—1.27)	1.13 (1.00—1.28)
Age (years)		
13 - 17	Ref	Ref
18 - 24	1.43 (1.19—1.72)***	1.41 (1.17—1.68)***
Marital status		
Never married	Ref	Ref
Currently married	1.13 (0.99—1.29)	1.22 (1.07—1.38)***
Highest level of education completed		
Primary or less than primary education	Ref	Ref
Secondary education or higher t	1.00 (0.87—1.16)	0.99 (0.86—1.14)
Close to biological parents		
No	Ref	Ref
Yes	0.58 (0.46—0.73)***	0.55 (0.44—0.70)***
Self-reported STIs		
No	Ref	REf
Yes	1.69 (1.35—2.11)***	1.77 (1.42—2.21)***

*=p<.05, **=p<.01, ***=p<.001. Sex, age, marital status, education, and close to biological parents were used as control variables, AOR = adjusted odds ratios, "Ref = reference group"

Discussion

This study estimated the prevalence of self-reported STIs diagnosis and their association with exposure to childhood violence and mental health outcomes among adolescents and young adults in Zimbabwe. The prevalence estimates of "STIs" among adolescents and young adults exposed to childhood violence, mental distress, and suicide ideations or attempts were generally modest in Zimbabwe. These findings align with previous studies in the United States [27, 47], suggesting a plausible consistency in prevalence ranges for young people. Specifically, in our study, only 8.5% of adolescents and young adults were exposed to multiple forms of childhood violence, 8.7% experienced childhood physical violence, 8.6% experienced child emotional violence, 12.3% experienced childhood sexual violence, and 9.9% witnessed physical violence reported having been diagnosed with STIs in Zimbabwe. In this regard, the highest self-reported STI prevalence rates were observed among those who experienced sexual violence, aligning with findings in Fan et al., [48] study with young women in Malawi. It is unsurprising that a significant number of individuals experiencing sexual violence, primarily women, might face an increased susceptibility to contracting STDs/STIs. The trauma linked to sexual violence can lead to engaging in unsafe sexual practices, including unprotected intercourse, multiple sexual partners, or participation in high-risk activities, and vice versa. [49, 50]. While the prevalence rates of self-reported STI diagnoses among adolescents and young adults exposed to multiple forms of childhood violence were modest, they aligned with the hypothesized direction in the present study. It is crucial to recognize that the self-reported nature of STIs and exposure to specific forms of violence and mental health, particularly sexual violence,

might have been underreported due to the fear of stigma and discrimination associated with knowing one's STI status. Consequently, it is plausible to argue that the rates of STIs may be higher than anticipated, particularly in the context of the present study.

We further found that adolescents and young adults with self-reported STI diagnoses were more likely to have experienced childhood sexual and physical violence as well as witnessed physical violence during childhood compared to those without self-reported STIs. This study validates the findings from prior research, such as the CDC-Kaiser ACE Study [51], associating STIs with exposure to multiple forms of childhood violence in Zimbabwe. For example, Wang [52] contends that being exposed to various forms of violence, such as childhood maltreatment or abuse, is significantly associated with early sexual initiation, having multiple sexual partners, engaging in transactional sex, unprotected sexual activities, and other risky behaviors. This, in turn, increases the likelihood of contracting STIs. Likewise, individuals diagnosed with STIs face an elevated risk of experiencing stigma and discrimination, making them susceptible to various forms of violence. Thus, there exists a reciprocal relationship between STIs and exposure to a wide range of violence. The prevalence of self-reported STIs linked to multiple forms of violence in this study highlights the importance of implementing strategies and programs aimed at improving STI testing, treatment, and prevention among adolescents and young adults [53].

Furthermore, there is a critical need for health authorities and relevant stakeholders in Zimbabwe and other Sub-Saharan African countries to develop and implement policies and programs that can facilitate easy access to STI prevention and treatment services for adolescents and young adults. Moreover, the literature review [54, 55] emphasizes that exposure to childhood violence contributes to various diseases and mental health problems for young people, a perspective further supported by the findings of this study.

Regarding the relationship between STIs and mental health outcomes among adolescents and young adults, our results revealed a strong association. In our study, 44.9% of adolescents and young adults with STIs reported moderate to severe mental distress. In comparison, 49.9% of adolescents and young adults with STIs reported suicide ideations or attempted suicide at some point during their lifetime. These results corroborate earlier studies [13, 54, 56], consistently identifying a strong link between indulging in sexual risk behaviors that may lead to STIs. For instance, several studies involving both adolescents and young adults also draw connections between mental health problems and STIs [29, 30, 57]. Young individuals diagnosed with mental health conditions, such as depression, have shown a heightened susceptibility to contracting STIs [31, 32]. In comparison to their non-depressed counterparts, depressed children and adolescents often exhibit weaker social connections and may demonstrate increased emotional responses during peer interactions, potentially contributing to greater engagement in risky behaviors related to STIs [55]. Another study by Merrick et al., [56] in southern California found emotional abuse, emotional neglect, and household mental illness to be the three most significant risk factors for attempted suicide among adults. However, our study in Zimbabwe highlighted that the most substantial risk factors for mental health outcomes (i.e., suicidal ideation and attempts) among adolescents and young adults were exposure to multiple forms of childhood violence, experiencing emotional and physical violence, and witnessing physical violence during childhood. This study underscores the potential benefits of early mental health interventions in mitigating the impact of violence among adolescents and young adults in Zimbabwe.

Efforts should focus not only on preventing and treating STIs but also on addressing the

underlying factors contributing to violence, as well as providing support for those who have experienced violence. Public health interventions that consider these interconnections can be more effective in promoting the overall well-being of individuals exposed to childhood violence in Zimbabwe.

Limitations of the Study

This study was a cross-sectional design, making it impossible for the establishment of causal relationships among variables. Sensitivity around discussing STIs, especially related to sexual health, led some participants to withhold information due to fear and stigma associated with the diagnosis of STI. Self-reported diagnosis of STIs, without confirmatory tests, may introduce bias, highlighting the need for future studies to prioritize objective testing of STIs in the clinical settings. This study did not distinguish between different types of STIs (e.g., syphilis, gonorrhea, chlamydia, etc.) but was reported in general terms, which makes it challenging to understand which of the STIs were more prevalent than others or could have a higher risk than others for both childhood violence and mental health problems. Finally, the current study focused on household surveys, limiting generalizability to the broader adolescent and young adult population living in the streets, orphanages, and other forms of institutional cares in Zimbabwe.

Conclusions

This study has shown that self-reported diagnosis of STIs increases the risk of exposure to multiple forms of violence and mental health problems (i.e., mental distress and suicidal ideations) for adolescents and young adults in Zimbabwe. There is a crucial need for health authorities and relevant stakeholders to formulate and implement policies and programs facilitating easy access to STI prevention and treatment services for adolescents and young adults in Zimbabwe.

Additionally, the study underscores the potential benefits of early mental health interventions in mitigating the impact of violence among adolescents and young adults who are already diagnosed with STIs across all regions in Zimbabwe. Understanding the intersection between STIs and violence is crucial for designing comprehensive public health programs. Efforts should focus not only on preventing and treating STIs but also on addressing the underlying factors contributing to violence, as well as providing support for adolescents and young adults who have either experienced or been exposed to any form of violence during childhood. Public health interventions that consider these interconnections can be more effectively promote the mental well-being and improve the quality of life of vulnerable adolescents and young adults in Zimbabwe.

Conflict of Interest

The author(s) have no conflicts of interest regarding this article's research, authorship, and publication.

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Research Output and Knowledge Translation Among Faculty Members of University of Technology, Jamaica

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Abstract

Universities are very important assets to produce research knowledge. The three major responsibilities of university faculty members are teaching, research, and community service. Balancing these three responsibilities is often very challenging, and the work that suffers most is research. The government of every nation looks up to its universities to produce research knowledge. The goal is to investigate the research output and knowledge translation among faculty members at Jamaica's national university. A descriptive quantitative cross-sectional design was used for this study. This design was used to collect data from faculty members at one point in time. Most of the respondents (56.3%) perceived a lack of protected time for research as a barrier to research productivity. Seventy-five percent of the respondents reported having published one research article as the first author in the last two years. The majority (75%) of the respondents have concerns about the research policy of the university. The most common perceived barrier to knowledge translation (KT) was a lack of awareness of the concept of KT. The faculty members are experiencing challenges in conducting research and translating research findings.

Keywords*: Knowledge translation, Research output.*

Introduction

Traditionally, universities have the responsibilities of conducting research and disseminating the findings of research. The three major responsibilities of university faculty members are teaching, research, and community service [1-3] A number of studies have identified obstacles to research productivity among university faculty members around the world [1, 4]. At the University of Technology, Jamaica, some faculty members have anecdotally expressed challenges balancing didactic instructions, clinical and laboratory facilitation, and conducting research. This problem warrants investigation. Knowledge translation involves the synthesis, exchange, and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people's health [5]. All areas of the discipline of health practice and policy should base decision-making on the best research evidence. Examples of critical questions requiring evidence-based answers include: How should health care providers and policymakers improve on existing health care interventions? What should health care providers do to increase safety? What about cost-effectiveness in health care practices and policies? Conducting research and using the findings is the answer to these questions. Failure to do so may result in serious consequences for consumers of health care and the inefficient use of limited resources for health care. It was recommended by [6] that examining the characteristics of the cultural, political, and economic context within which research is conducted and transfer activities are implemented is important. Production and translation of local evidence in health research are important. Moreover, health researchers

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have the responsibility to collaborate with stakeholders not only in disseminating research findings but also at the conceptual stage of research. Universities are expected to contribute to policy positions in various areas of human endeavour. The study of knowledge translation is a developing area, especially in developing nations. This study is expected to pave the way for more studies in the Caribbean in the area of KT. Understanding KT activities among stakeholders in health care delivery will significantly reduce the gap that exists between knowledge, practice, and policy. The highlighted importance of the translation of knowledge generated from health research to key stakeholders responsible for health care policy and service delivery justifies the importance of this study. Knowledge translation is required for delivering the benefits of health research so that research results can be utilized to solve health problems as well as formulate evidence-based health policies, but at this point, it is important to address yet another very important challenge, which is the barriers to research output among faculty members. Universities are very important assets to produce research knowledge [1].

The three major responsibilities of university faculty members are teaching, research, and community service [1, 2]. Balancing these three responsibilities is often very challenging, and the work that suffers most is research [2]. The government of every nation looks up to its universities to produce research knowledge, but there are constraints among faculty members in low- and middle-income countries in fulfilling this responsibility [1, 4]

The World Health Assembly in May 2005 called for more research in developing countries to strengthen health systems [7]. The aim is to investigate the research output and knowledge translation among faculty members at Jamaica's national university. It was recommended by [6] that examining the characteristics of the cultural, political, and economic context within which research is conducted and transfer activities are implemented is important.

Materials and Methods

Research Design

A descriptive quantitative cross-sectional design was used for this study. This design was used to collect data from the participants at one point in time. The survey was conducted to describe the nature of research productivity and knowledge translation among the respondents.

Area Of Study

There are eight faculties or colleges at the University of Technology Jamaica, namely, the College of Business and Management, the College of Health Sciences, the Faculty of Built Environment, the Faculty of Education and Liberal Studies, the Faculty of Engineering and Computing, the Faculty of Law, the Faculty of Science and Sports, and the Joint Colleges of Medicine, Oral Health, and Veterinary Sciences. The strategy map of the university includes a student-centred and research-driven working environment where core values are lived by all. While Core Processes focuses on applied research for national impact and encourages pure research for breakthrough discovery, to achieve this mission, emphasis must be placed on research and the utilization of the findings of research in decision-making.

The university's mission is to positively impact Jamaica and the wider Caribbean through high-quality learning opportunities, research, and value-added solutions to government, industry, and communities. This will be accomplished through "focusing on applied research to address national and regional challenges and by lobbying decision makers." The mission of the university underscores the importance of research productivity and knowledge translation among the faculty members.

Study Population

The target population of this study consists of full-time faculty members in health-related departments namely, College of Health Sciences and Joint Colleges of Medicine Oral health and Veterinary Sciences. There are 56 faculty members in College of Health Sciences and about 20 faculty members in Joint Colleges of Medicine Oral health and Veterinary Sciences.

Sampling Method

The survey instrument was sent to all respondents via email in November 2022. This is a method in which data is collected from everyone in the target population. This method has the advantage of timeliness; it is also effective in minimizing sampling bias. Census method is preferred over sampling whenever this possible [8]. Furthermore, because data collection was done electronically, this reduced time consumption associated with census survey.

Data Collection Procedure

The data collection instrument that was used is a questionnaire. The questionnaire consists of three sections, namely A, B and C of which some items are Likert-type questions [9]. Section A focuses on Socio-demographic data of each participant. Section B covers items on Research Productivity among faculty members. This gives the researcher an idea about the factors that influence the research output of the respondents. Section C covers questions about Knowledge Translation (KT) practices of the respondents. After obtaining ethical clearance from the research ethics committee of the university email list of the respondents were accessed and the survey instrument was sent via email to all the faculty members who meet the inclusion criteria namely full-time academic staff within the study population. Data collection started in November 2022 and ended in January 2023. The response from the participant was very slow so follow up emails were sent to maximize response, but the response rate was still poor.

Data Analysis

Data was analysed using Microsoft Excel and Statistical Package of Social Sciences (SPSS) version 21 to address the aim and objectives of the study: to determine the barriers and enhancers of research output of faculty members as well as their knowledge translation activities. Results of the analysis was presented in tables and charts.

Results

Table 1. Socio-demographic Characteristics of the Respondents

Socio-Demographic Data	**Mean**	**Range**	**Standard Deviation**	**Sum**	**Total N**
Age	2	3	1	37	16
				Number	**Percentage (%)**
Gender		Female		12	75.0%
		Male		4	25.0%
Highest level of education completed		Master of Philosophy		0	0.0%
		Master of Science degree		10	62.5%
		Doctor of philosophy		4	25.0%
		Other doctorate degrees		2	12.5%
		Others		0	0.0%
College/Faculty		College of Health Sciences		15	93.8%
		Joint colleges of Medicine, Oral Health, and Veterinary Sciences		1	6.3%
Current position		Lecturer		13	81.3%
		Senior Lecturer		0	0.0%

	Associate professor	2	12.5%
	Professor	1	6.3%
	Others	0	0.0%
Employment type	Tenured	8	50.0%
	Untenured	8	50.0%
Current discipline	Dentistry	0	0.0%
	Epidemiology	1	6.3%
	Nursing	10	62.5%
	Nutrition /Dietetics	1	6.3%
	Medical laboratory Science/Technology	0	0.0%
	Medicine/Surgery	0	0.0%
	Pharmacy	2	12.5%
	Public health	1	6.3%
	Others	1	6.3%
Administrative responsibilities	Yes	9	56.3%
	No	7	43.8%
Research interest	Knowledge Translation	1	6.3%
	Nutrition obesity, chronic non communicable diseases	2	12.5%
	Clinical Pharmacy	1	6.3%
	Education	1	6.3%
	Emergency/critical care nursing	2	12.5%
	nursing and health related issues	1	6.3%
	public health	4	25.0%
	Infectious diseases, specifically HIV prevention and control	1	6.3%
	Chronic diseases, paediatric diabetes	2	12.5%
	Gerontology	1	6.3%

The descriptive statistics of the socio-demographic data of the respondents in this study. The mean age of the respondents is 37 years, with a range of 2-3 years and a standard deviation of 1. There were 16 respondents in total, with 75% of them being female and 25% being male.

In terms of the highest level of education completed, 62.5% respondents had a Master of Science degree, 25% had a Doctor of Philosophy degree, and 12.5% had other doctorate degrees. Most of the respondents 93.8% were from the College of Health Sciences, with only 6.3% respondent from the Joint colleges of Medicine, Oral Health, and Veterinary Sciences.

In terms of current position, 81.3% respondents were lecturers, 12.5% were associate professors, and 6.3% was a professor. The employment type was evenly split, with 50% respondents being tenured and 50% being untenured. The most common discipline among the respondents was nursing, with 62.5% respondents. Only 12.5% respondents were from the pharmacy discipline. In terms of administrative responsibilities, 56.3% respondents had such responsibilities, while 43.8% did not. Four respondents 25% selected

Public Health as their area of research interest. Other topics of interest included chronic non-communicable diseases, emergency/critical care nursing, and infectious diseases, among others.

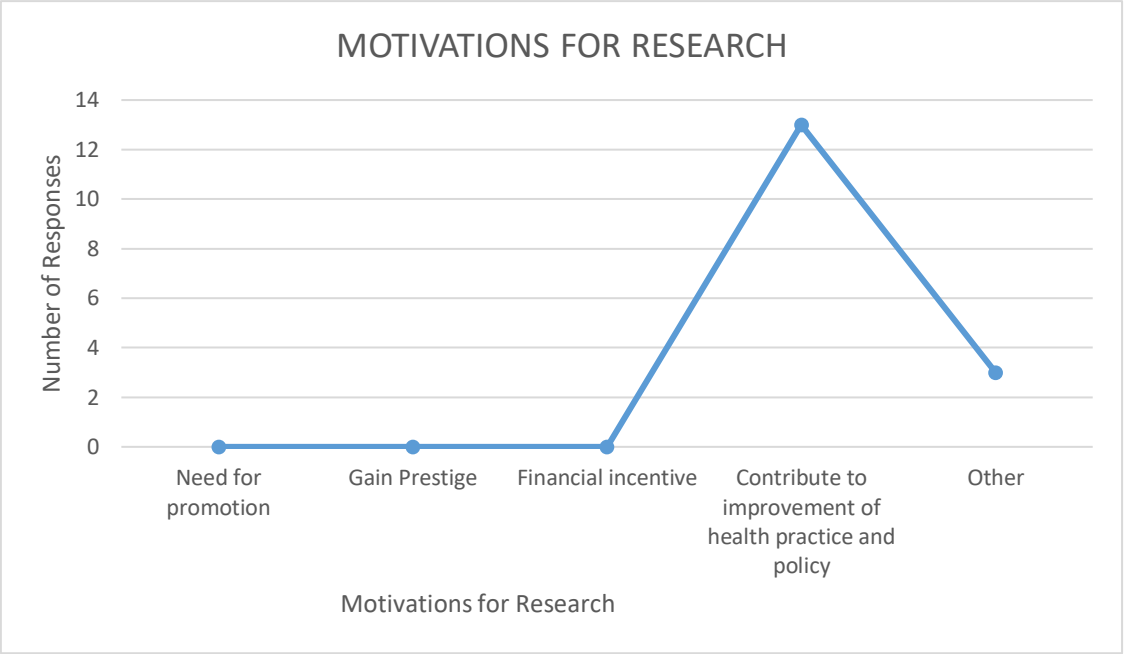

Figure 1. Participant's Motivation for Research

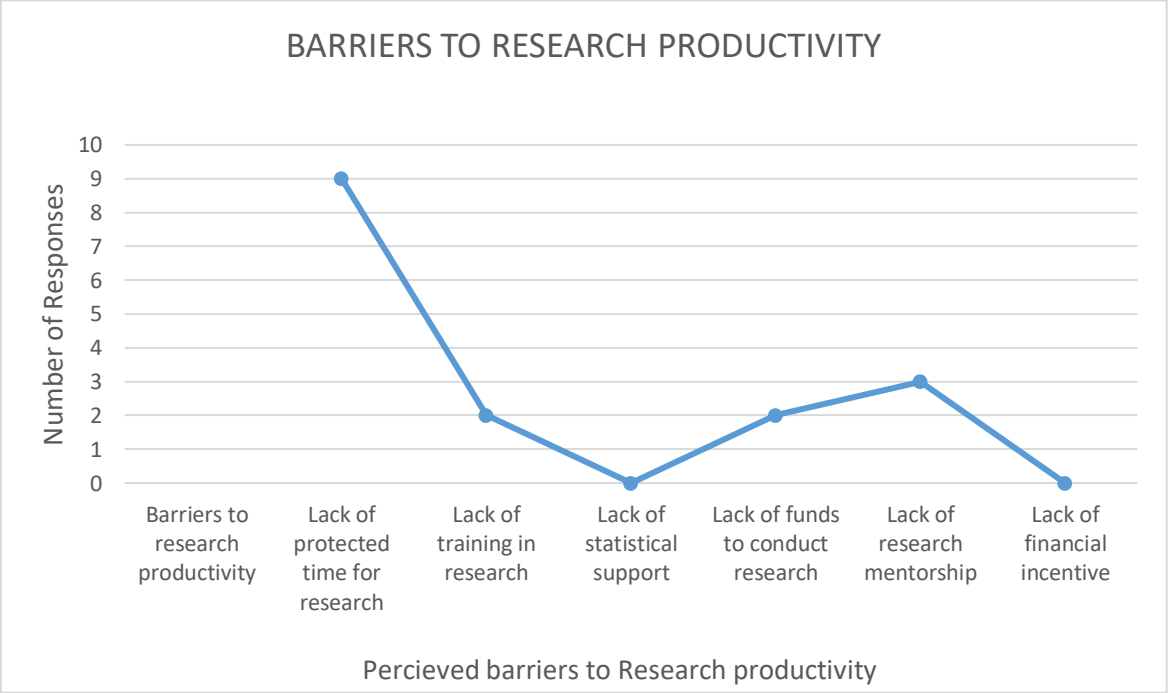

Figure 2. Respondent's Perception of Barriers to Research Productivity



Figure 3. Hours Spent Weekly on Research Work by Respondents

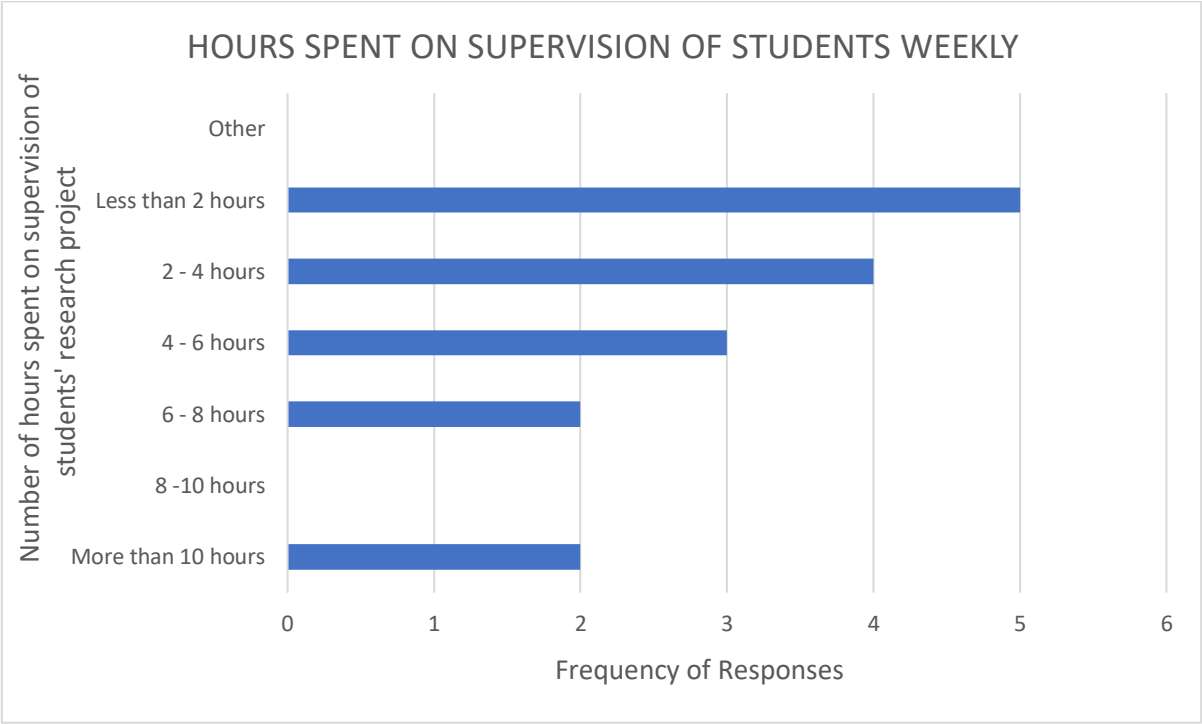

Figure 4. Hours Spent Weekly on Research Supervision by Respondents

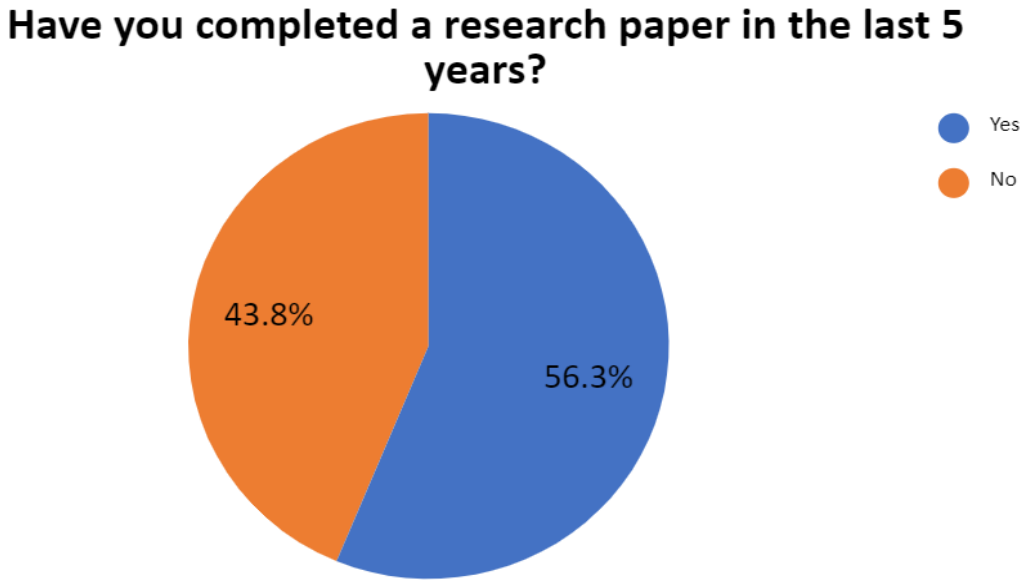

Figure 5. Participants' Responses about Completing Research Paper in the Last Five Years without Publishing

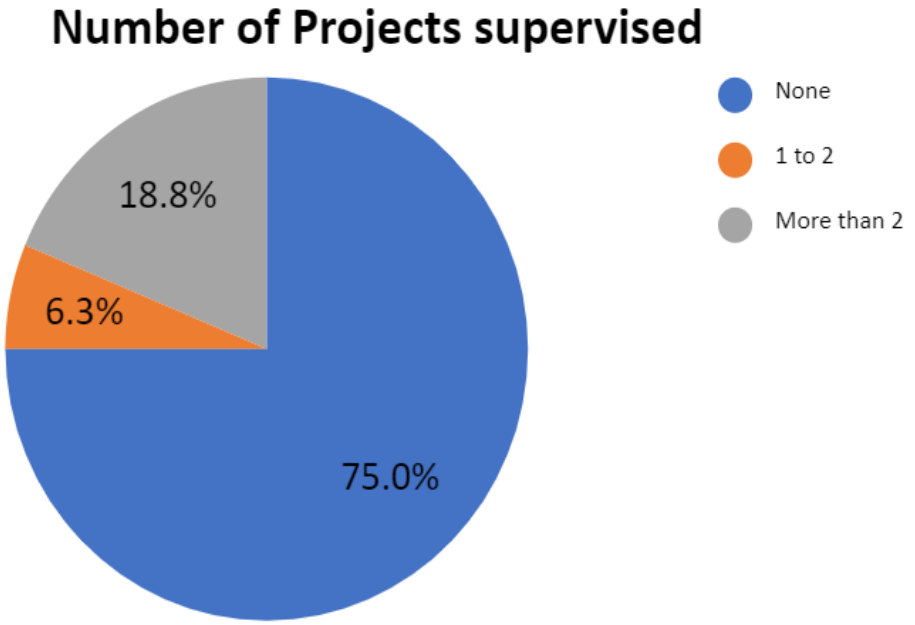

Figure 6. Number of Published undergraduate Students' Research Projects Supervised by the Respondents in a Peer Review Journals in the last Five Years

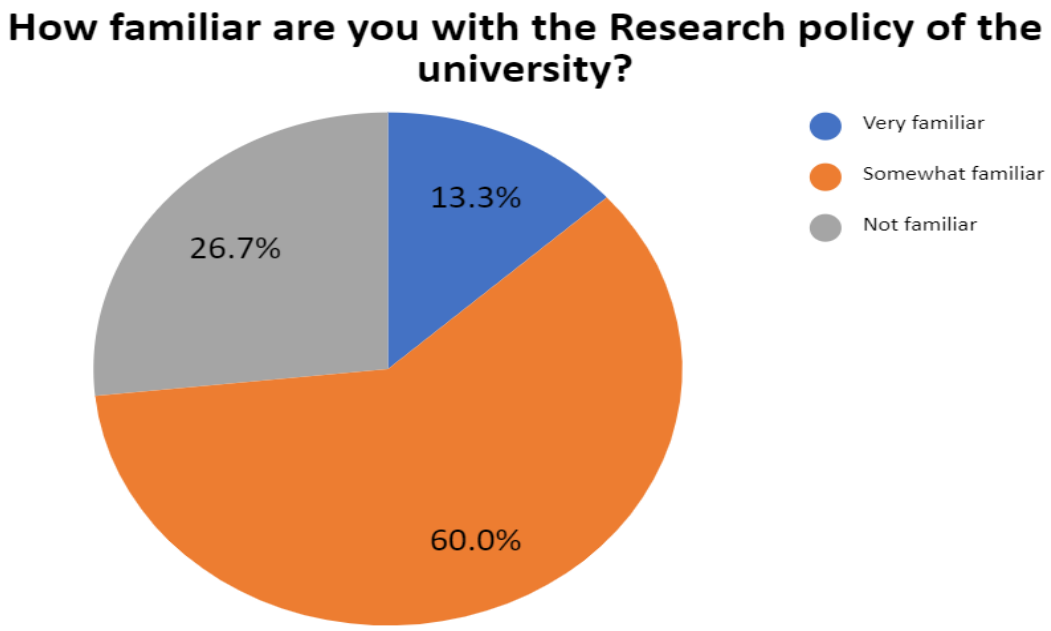

Figure 7. Respondent's Familiarity with the University's Research Policy

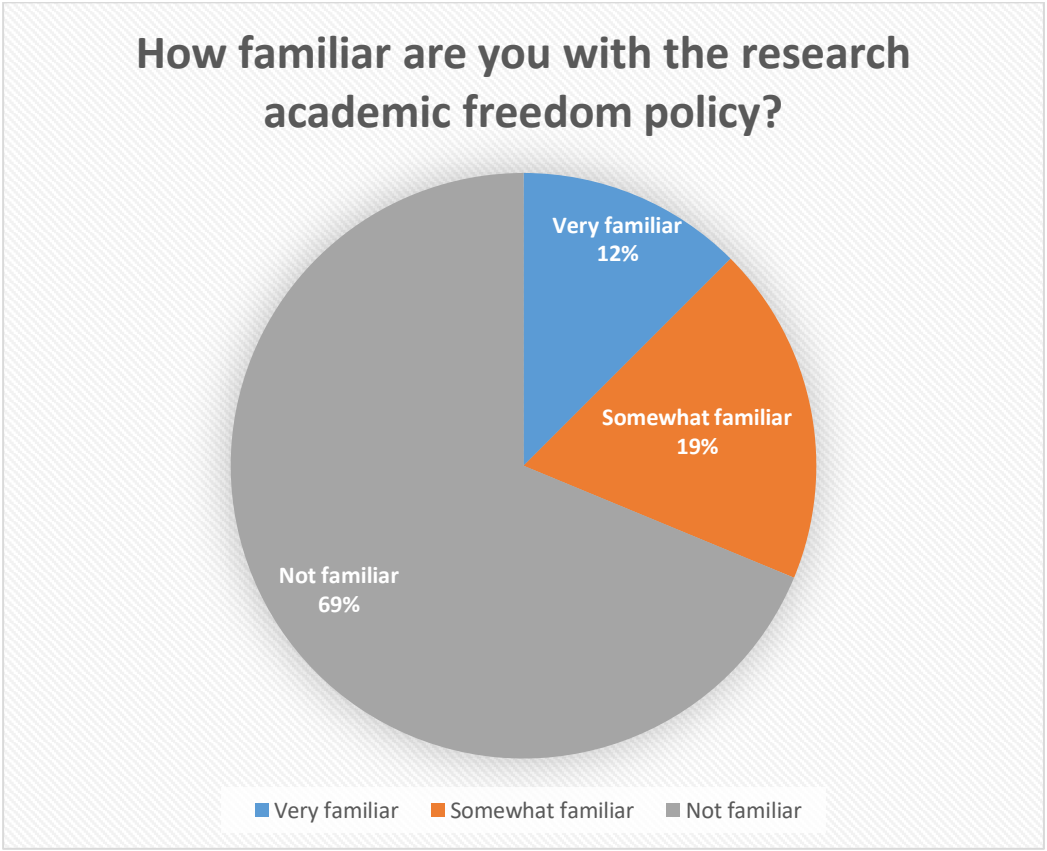

Figure 8. Respondent's Familiarity with the University's Academic Freedom Policy

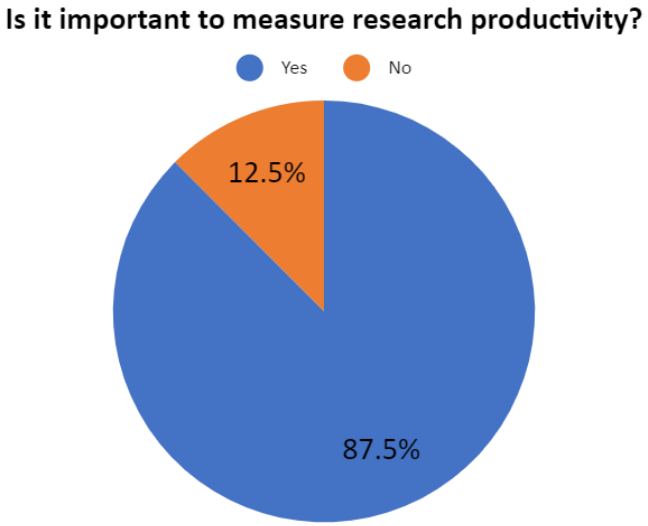

Figure 9. Participant' Responses about the Importance of Measuring the Research Output of each Faculty Member

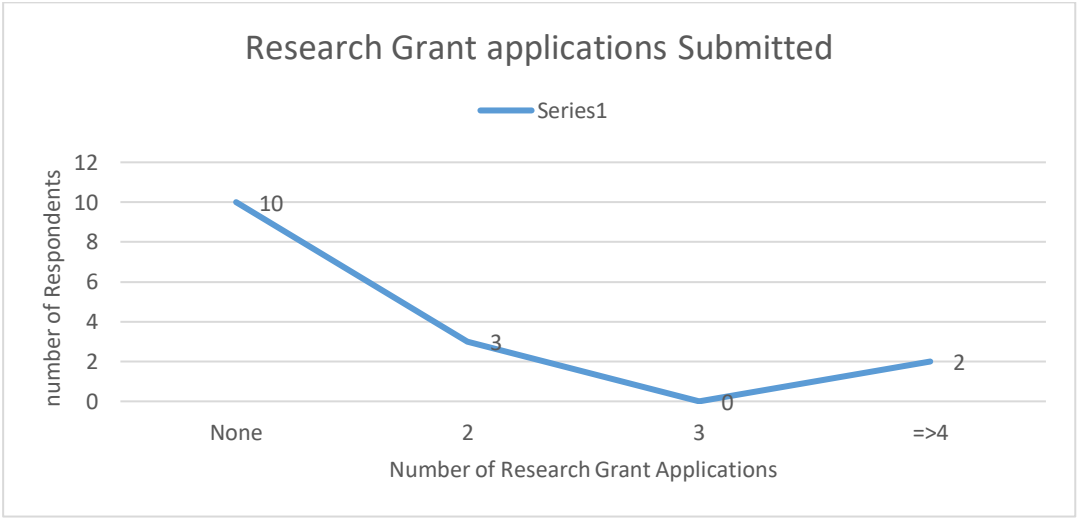

Figure 10. Line Graph Depicting Research Grant Applications Submitted by the Respondents

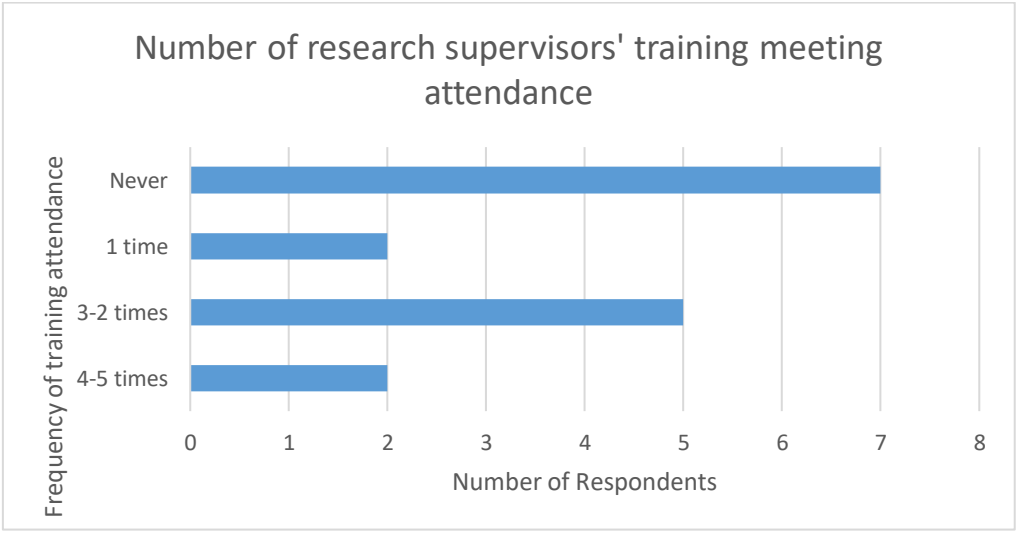

Figure 11. Distribution of Respondents' Attendance of Training for Research Supervisors in the Last 5 Years

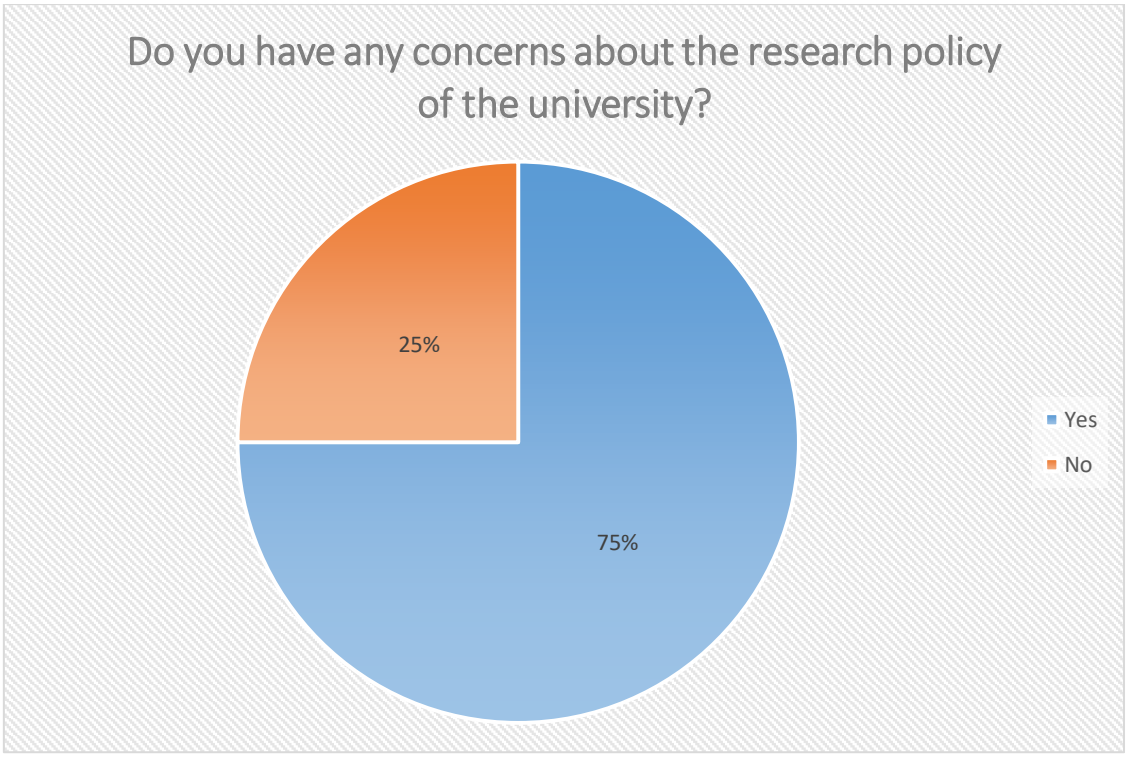

Figure 12. The Participants' Responses about Research Policy of the University

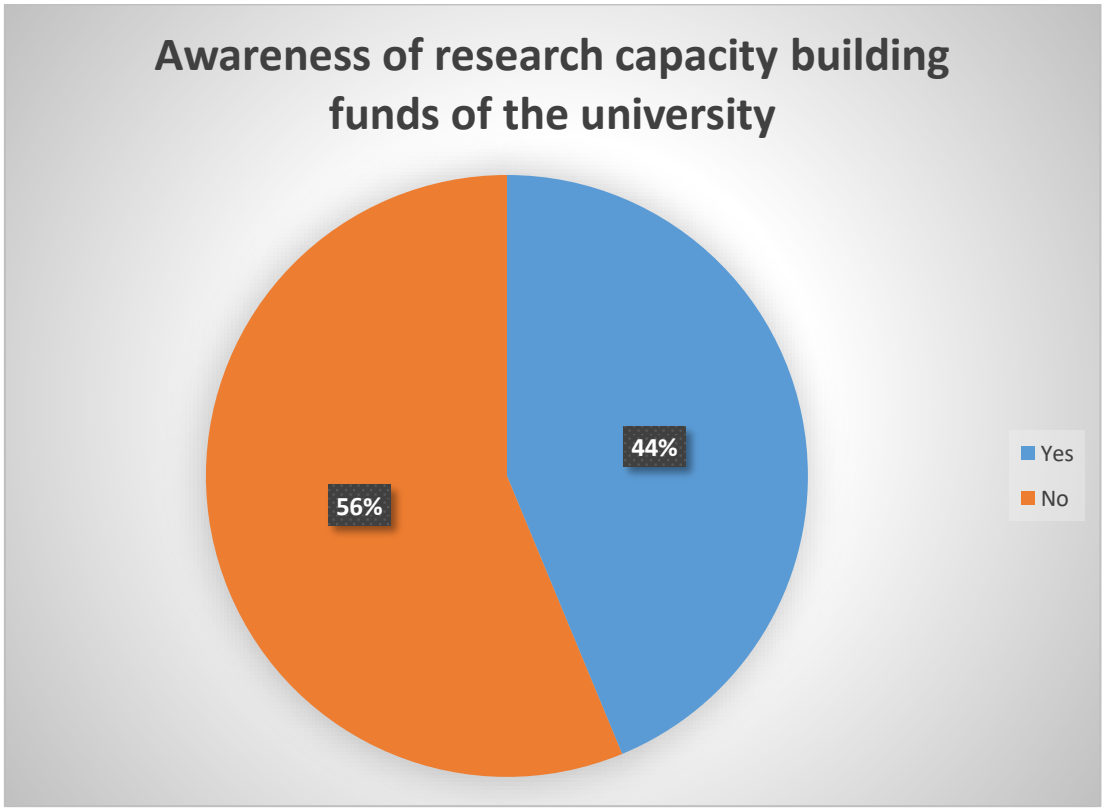

Figure 13. Distribution of the Awareness of Research Capacity Building Funds of the University

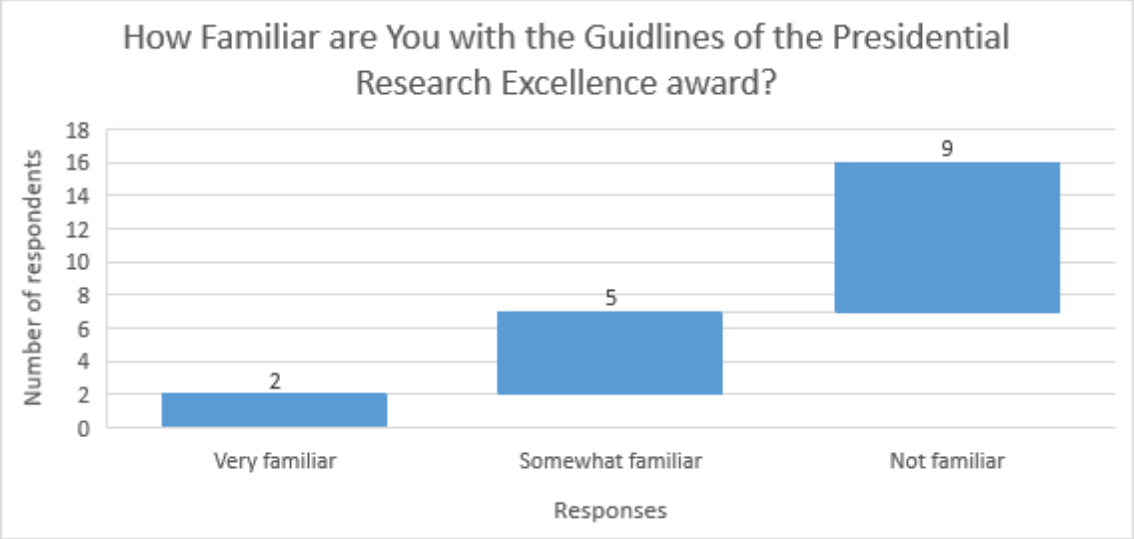

Figure 14. Familiarity with Guidelines of Presidential Award for Research Excellence



Figure 15. Invitation to Research Supervisors' Training

Table 2. Perceived Barriers to Knowledge Translation

Barriers	**Not a barrier**	**Somewhat a barrier**	**Moderately a barrier**	**Extreme barrier**
Lack of awareness of knowledge translation concepts	4 (25%)	7 (4.8%)	2 (12.5%)	3 (18.8%)
Lack of delivery of research results to Decision Makers	2 (12.5 %)	7 (4.8%)	4 (25%)	3 (18.8%)
Little or no communication between researchers and policy makers	1 (6.3%)	3 (18.8%)	4 (25%)	8 (50%)
Mistrust between researchers and policy makers	1 (6.3%)	8 (50%)	6 (37.5%)	1 (6.3%)

Inappropriate research priorities in comparison to current health needs	0 (0%)	4 (25%)	5 (31.2%)	7 (48.8%)
Low or no research budget for Knowledge translation	1 (6.3%)	6 (7.5%)	2 (12.5%)	7 (48.8%)
Research results are not applied to decision making	1 (6.3%)	6 (7.5%)	2 (12.5%)	7 (48.8%)

Discussion

Barriers To Research Productivity Among Faculty Members

Research productivity is essential for advancing knowledge and improving healthcare delivery in the health professions. The current study however identified some challenges associated with research output and knowledge translation among faculty members. Among the respondents of this study only 25% are holders of Doctor of Philosophy degree. Possession of a PhD appears to have a positive impact on research productivity. This is the result of a study conducted among faculty members of a dental school in Malaysia. The investigators concluded that more years in academia and a PhD degree favours research productivity therefore they recommended that postgraduate research training should be encouraged to enhance research output [10].

Time Constraint for Research

Lack of protected time for research is perceived as a barrier to research productivity among the respondents of this study. Several other studies have examined the barriers to research output among faculty members. Lack of time is consistently identified as the largest barrier to research activity [11]. Most of the respondents for the current study are faculty members from the nursing department. Other related studies have reported that nursing faculty members often face various barriers that hinder their ability to conduct scientific studies with lack of time being a significant one. Heavy workloads, competing responsibilities, and the demanding nature of clinical and academic roles can all contribute to time constraint, significantly impeding nursing faculty members' research productivity. The literature has well-documented the lack of time as a barrier to research output among nursing faculty members. For instance, [12] identified poor staffing resulting in high workloads and lack of time for research productivity. Nursing faculty members often have demanding responsibilities, both in the clinical and academic realms. These responsibilities include teaching, clinical practice, supervising students, and administrative tasks. One significant barrier to research output is the shortage of nursing faculty. Most nursing faculty members come from a clinical background with limited preparation for the faculty role, which hinders their ability to engage in research [13]. The shortage of faculty also impedes nursing research and practice development, as it limits the availability of mentors and resources for junior faculty members [13]. Shortage of time to conduct research is a recurring impediment to research output [14, 15, 11]. Protected time for research can facilitate the completion of research projects [16, 17] found that protected research time was positively associated with the completion of research projects among academic faculty members in the United States. The authors noted that protected time allowed faculty members to dedicate sufficient time to their research projects, thereby enhancing their chances of completing their projects on time. [18] found that protected time for research was positively associated with research productivity among academic faculty members in the United Kingdom. The authors noted that protected time allowed faculty members to focus on research activities without being distracted, thereby increasing their research output. In a study in a

Mediterranean nation (Iraq) a study was conducted among faculty members of two nursing colleges to identify barriers to research. The top barrier reported was lack of time [19]. Barrier to research among postgraduate lecturers in Dentistry was like other faculty members namely "lack of time due to other commitments" [11]. The findings showed that around personal obstacles, the lack of time and business factor had the highest average score [20] The respondents of a research among academic staff at five Sudanese medical faculties reported "lack of allocated time" for research work as a barrier to research. Similarly lack of time due to teaching workload constitutes a hindrance to research in a Malaysian nursing school [21, 22]. A study was conducted to identify barriers to research productivity among gastroenterologist in Saudi Arabia. The investigators performed multivariate analysis to examine associations between diverse factors and research productivity. It was concluded that the top barrier to research is insufficient time [23]. Both Institutional factors and Individual factors seem to play a role in research productivity. Family-related responsibilities impeded research productivity among females [24]. Motivation to conduct research and increasing lecturers' esteem were found to be facilitators to research productivity [25]. Institutional support and research policies such as enabling an environment for research, training courses and mentorship are more attributed to research productivity compared to individual factors [26, 1, 27] explored determinants of research productivity at a Kenyan Technical university. The investigators found that insufficient funding, lack of motivation, time constraint and lack of equipment are impediments to research output in the university [27]. A consistent barrier to research output among faculty members in most of the studies on this subject seems to be lack of time. Among the respondents of a similar study, those without a single published paper constituted 57%. Some of the reasons given for not having any published papers were "no writing experience, high publishing fee, and long waiting period for peer review. Surprisingly the participants of this study conducted in Nigeria did not perceive lack of time as an impediment to research [28]. Another significant finding of this study is the low research publication rate among the respondents. Most of the respondents published only one research article in the last two years, completed a research project in the last five years but have not been published, and consequently, they are not satisfied with their research output. Similar findings were observed in other studies. For instance, [29] reported that health researchers from low-income countries are underrepresented in research publication and therefore recommended interventions to improve research publications. Majority of the respondents of this study opined that teaching responsibilities take priority over research at this university. This finding is like the findings of other studies. Teaching responsibilities can have a significant impact on the research output of faculty members [30]. The allocation of time for teaching, including class preparation, lectures, and grading, can limit the time available for research activities. This can result in delays in completing research projects and a decrease in the number of publications produced [30]. Teaching responsibilities also divert attention and energy away from research activities [30]. Faculty members may need to invest time and effort in developing their teaching abilities, which can take away from time that could be devoted to research. Additionally, teaching responsibilities often involve interacting with students, advising, and mentoring them, and participating in departmental and institutional committees and meetings. While these activities are important, they can be time-consuming and distract faculty members from their research pursuits [30].

Time Management for Research Productivity

A preponderance of the respondents of this study spends less than 2 hours weekly doing

research work. This is less than the time required officially by the university for doing research work. Could this suggest challenges with time management? Time management competencies play a crucial role in the research output of faculty members. Effective time management allows faculty members to allocate sufficient time and attention to their research activities, leading to increased productivity. Research has shown that time management skills positively influence research productivity among faculty members [31]. A mixed method study conducted by [17] at an African university indicated that faculty members need personal development and time management skills among other competencies. Faculty members who possess strong time management skills are better able to prioritize their tasks, set realistic goals, and allocate dedicated time for research activities. This enables them to effectively manage their workload and balance their teaching and research responsibilities [31]. Organizational skills help faculty members in planning and structuring their research projects, managing data and resources, and meeting deadlines [32]. Effective organization skills enable faculty members to streamline their research process and ensure that they stay on track with their research goals. Balancing responsibilities in teaching, scholarly activities, clinical practice, and service is another critical aspect that requires effective time management competencies [33]. Effective time management enable faculty members to allocate sufficient time for each of these responsibilities, ensuring that none of them is neglected. Furthermore, time management competencies are also important in managing interruptions and maintaining focus on research tasks.

Research Team and Research Output

Most of the respondents in this study expressed a desire to join a research team as they believe that teamwork will enhance their research productivity. Being part of a research team can have a significant impact on research output, as it allows for the sharing of resources, knowledge, and expertise, as well as the division of labour and workload distribution. Collaborative environments fostered by research teams can also encourage creativity and innovation, leading to higher quality research outputs [34]. Collaboration among faculty researchers can also enhance the dissemination and impact of research findings. According to a study by [35], papers with multiple authors tend to receive more citations than papers authored by a single individual. The study suggests that collaboration can lead to higher-quality research and more innovative ideas, which are more likely to be recognized and cited by other researchers. Research has consistently shown that effective teamwork enhances productivity, creativity, and the overall success of research projects [36]. Transdisciplinary research emphasizes the integration of knowledge from various groups, including scientists, policymakers, and regulators [37]. By incorporating different epistemologies and engaging in collaborative practices, research teams can address complex societal challenges more effectively [37]. Moreover [38] posited that the research teams are better in terms of output and citations compared to single-author researcher, with multi-authored publications being cited more frequently than single-authored publications ultimately increasing their research output. Research teams provide a supportive and collaborative environment that fosters creativity and innovation. The exchange of ideas and feedback among team members can lead to new insights and approaches to research questions, resulting in higher-quality research outputs and innovative solutions to complex problems [34]. Moreover, collaborative environments fostered by research teams can encourage the dissemination and impact of research findings. Research teams usually possess a wider network of collaborators and connections, which can help to disseminate research findings to a broader audience, including other researchers, policymakers, and stakeholders.

Mentorship And Research Productivity

Nearly all respondents in this study agree that research mentorship can significantly enhance research their output. The lack of mentorship and guidance is identified as a critical barrier to research productivity and output. Early-career researchers require guidance and mentorship from experienced researchers to develop their skills, design rigorous studies, and navigate the publication process. [39] identified lack of mentorship and guidance as a significant barrier to research productivity and output among nurse academics. The study found that mentorship and guidance improve researchers' confidence and motivation, leading to higher research output.

Motivation For Research

The study's findings reveal that the primary motivation for research among the participants is to contribute to health service and health policy. Interestingly, the study also found that none of the participants are motivated by promotion, financial incentives, or gaining prestige. One key motivation for conducting research among academicians is career advancement. Research productivity is often a significant factor in academic promotion and tenure decisions, and therefore, academics may be motivated to conduct research to advance their careers [40]. Research can lead to external funding opportunities, which can further enhance academic reputation and career prospects. But none of the respondents of this study reported these advantages as a motivation for engaging in research. Recent research has also identified the importance of intrinsic motivation for conducting research among faculty academics. For instance, [40] found that intrinsic motivation was a stronger predictor of research productivity among faculty members than extrinsic motivation. Intrinsic motivation, such as the enjoyment of the research process or the desire to learn new things, was found to be a more sustainable and fulfilling source of motivation for conducting research. Additionally, research can positively impact teaching and clinical practice, which in turn can motivate academics to engage in research activities. Research findings can inform teaching methods curriculum development, clinical practice guidelines, and interventions [41].

Knowledge Translation (Kt) Among Faculty Members

The most common barrier to KT, as perceived by respondents, is "having little or no communication between researchers and policy makers". The lack of effective communication between researchers and policy makers is a common barrier to knowledge translation, hindering the utilization of evidence-based information for shaping policies and programs, ultimately limiting the impact of research findings on real-world issues. Despite the abundance of information available to guide policy formulation, the transformation of information into actionable policies and its successful implementation in public health initiatives remain significant challenges [42]. Translation of research evidence into actionable policies and its successful implementation in public health initiatives remains a challenge despite the abundance of available information to guide health policy formulation [43]. One major hurdle is the lack of effective communication among researchers, healthcare professionals, and policymakers. [42] underscored the need for collaboration between researchers and decision makers. Researchers and policymakers often operate on different timelines and have different agendas. Researchers require longer timelines conduct rigorous research design, data collection, analysis, and peer review. In contrast, policymakers frequently face time-sensitive demands to address pressing issues and make prompt policy decisions. This discrepancy in timelines can create a mismatch between the availability of research evidence and the immediacy of policy needs, making it challenging for policymakers to wait for comprehensive results of scientific study [44].

One advantage of discussions between health researchers and policy makers is that they can improve the relevance and impact of research. Policymakers' insights into current health policies and practices can help researchers to align their research questions and designs with the needs of policymakers and their constituents [45], enhancing the usefulness and applicability of research for policy decisions. Discussions between policy makers and researchers can facilitate evidence-based policy decisions. Health researchers can provide policymakers with the latest evidence on the effectiveness of health interventions and policies, helping them to make informed decisions that are based on scientific evidence rather than personal or political opinions [45]. Moreover, discussions between health researchers and policymakers can enhance the dissemination and implementation of research findings. Collaboration allows for the identification of effective strategies to share research results with policymakers and ensure that they are translated into health policies and practices [45]. As a result, this can increase the likelihood of research findings being put into practice and having a positive impact on public health. Policymakers can provide insights into areas of policy where evidence is lacking, and researchers can use this information to guide their research agendas and prioritize areas of research that are most relevant to policy [45]. The absence of communication between health researchers and policy makers can lead to several drawbacks that can ultimately affect public health outcomes. These drawbacks include an absence of synchronization between research and policy, uninformed policy decisions, and a failure to translate research findings into policy and practice. When discussions do not take place, researchers may not be aware of current policy priorities, and policymakers may not be informed of the latest research evidence. As a result, research questions and designs may not align with policy needs, and policies may not be based on the most recent scientific evidence. This can lead to research that has limited relevance to policymakers and policies that have little impact on public health outcomes [45].

Another disadvantage of the lack of communication between health researchers and policy makers is uninformed policy decisions. In the absence of discussions, policymakers may make decisions based on personal or political opinions rather than evidence-based information. This can lead to policies that are not effective, inefficient, or even harmful to public health [45]. Moreover, the absence of communication can lead to a failure to translate research findings into policy and practice even when the evidence is available. Without discussions, the research may not be effectively translated into policy and practice, which can result in research findings having limited impact on public health outcomes and missed opportunities to improve public health [45].

The Need for Training in Knowledge Translation Among Faculty Members

A significant number of respondents in this study expressed the need for Knowledge translation training. Knowledge translation (KT) is the process of moving research evidence into practice, policy, and decision-making. Many researchers have not been trained in KT, which can limit their ability to effectively communicate their research findings to decision-makers and stakeholders. A study of 405 Canadian health researchers revealed that only 30% had received training in KT, and only 10% reported feeling well-prepared to engage in KT activities [46]. KT training can improve research impact. Research has shown that KT training interventions have led to significant improvements in knowledge, skills, and attitudes related to KT among researchers, thus improving the likelihood that research findings will be used in health policy and practice. A systematic review of 35 studies found that KT training interventions led to significant improvements in researchers' ability to engage in KT [47]. There

are several barriers to providing KT training to researchers, including lack of resources, time, and incentives. A survey of 242 Australian researchers found that the most common barriers to engaging in KT activities were lack of time (77%), lack of funding (63%), and lack of incentives (47%) [48]. Collaboration between researchers and knowledge users, such as policymakers and practitioners, can facilitate the translation of research evidence into practice. Strong evidence suggests that KT platforms support the use of research evidence in health decisions in low and middle-income countries [49]. A survey of Canadian health researchers found that only 30% had received training in knowledge translation, and only 10% felt well-prepared to engage in knowledge translation activities [46]. Similarly, lack of training has been identified as a barrier to engagement in knowledge translation activities among nursing faculty members in the US, with only 27% reporting feeling confident in their ability to engage in such activities [50]. Lack of training has also been identified as a barrier among faculty members in medical schools in the US with only 37% reporting having received training in knowledge translation [51].

Insufficient Communication Between Policymakers and Researchers

A major obstacle to converting research findings into substantial policy decisions is a lack of good communication between researchers and policymakers. This divide eventually reduces the influence of research on real-world issues by making it more difficult to use evidence-based information to modify policies and initiatives. This lack of communication is caused by several factors, such as faculty members' lack of knowledge translation training and obstacles including time, resources, and incentives. Each of these elements has implications on both research and health policy.

Various Schedules and Plans: Longer deadlines are frequently followed by researchers since they are necessary for meticulous study design, data collecting, analysis, and peer review. On the other hand, legislators are frequently under pressure to act quickly to resolve urgent matters and make policy decisions. The mismatch between the availability of research findings and the urgency of policy demands resulting from this timetable disparity might make it challenging for policymakers to wait for thorough research outcomes [44].

Jargon and Communication Styles

Policymakers and researchers frequently speak in different languages. Although scholars may employ technical jargons and complex terminology specific to their field of expertise, decision-makers need succinct, comprehensible material that directly tackles policy issues. This discrepancy in communication styles might cause miscommunications and impede the efficient utilization of knowledge [52].

Lack of Involvement with Stakeholders

It is imperative to involve stakeholders in the process of determining research priorities, including patients, healthcare providers, lawmakers, and community members, to guarantee that research is in line with practical demands. Research findings and practical application may not align if these stakeholders are not included [53]. Almost all the participants in a descriptive qualitative study on KT practice among Manitoban health researchers use dissemination as their primary method of KT practice, as opposed to cooperation [54]. The researchers also pointed out that better funding policies and training programs are required for KT operations. Research priorities were not jointly determined by researchers and decision-makers, according to a mixed-methods study of KT activities involving 88 Iranian health researchers. Individual interests guide the themes that the researchers select. The publishing of study publications in journals and presentations at conferences and seminars were

two ways that the participants were informed about the research findings [55]. This suggests that at the start of the research project, there was no cooperation between the researchers and stakeholders. In a qualitative study, [56] investigated how scholars and decision-makers in Uganda's public health system see the significance of evidence-based policymaking. The researchers concluded that while policy ought to be informed by research findings, this does not always happen.

Conclusions

Overall, the research output of faculty members of this university is low while Knowledge Translation among the respondents is extremely low. They indicated interest to be trained in KT. Most of the faculty members are dissatisfied with their research output. Although the faculty members do supervise research projects or their students, but very few were submitted for publication. Some of the factors responsible or these findings includes lack of sufficient motivation for research, need for protected time for research, and inability to balance research work with teaching activities. Most of the respondents are not familiar with the research policy of the university and have concerns with the research policy of the university and finally majority of the research participants indicated interest to be part of a research team.

Conflict of interest

The author has received no funding from any organization for this study as such there is no conflict of interest.

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Enhancing Strategic Planning for High - Performance of Catholic Institutions in Zambia

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Abstract

The Church is a non-profit commonweal and service organization. She exists for the promotion of integral human development. She does this through her institutions of education, health, spiritual - pastoral and social welfare. However, most of these Catholic institutions are managed with insufficient strategic planning. As a result, low performance characterizes them. The focus of this paper is enhancing strategic planning for high - performance of Catholic institutions in Zambia. It underscores the need for strategic planning for efficient and effective management of Catholic institutions and identifies deficient proficiency because of inadequate strategic planning. The study was conducted in seven (7) institutions in Lusaka District and some parts of Central Province. The sample size was 257. There were 252 questionnaires which were administered purposively and randomly to first line, middle and top leadership, and management positions, and 5 in-depth interviews were purposively carried out. The research discovered that Catholic institutions were not proficient because they did not have a clear vision, precise policies and procedures, sufficient financial capacity and did not have the ability to adapt to changing times. Recommendations were made thus, to build capacity of leaders and managers in the areas of management audit, leadership and management development, and strategic management. Theoretically, the results can be generalised to all Catholic institutions in Zambia.

Keywords: *Catholic institutions, management audit, leadership and management development, Strategic planning, strategic management.*

Introduction

The Church has been described, among others, as an institution. Like any other institution, it requires a roadmap, a strategic plan, in order not only to operate well, but also to give direction into the future. This is because every organization must respond constantly to the current trends and their implications for what we do as individuals as well as institutions [1]. Every development or charitable organization wants to survive and prosper. To do so, it must respond and adjust to the social, economic and political environment and the changes therein. Changes in the outside environment occur constantly, even in stable societies. Strategic planning is therefore a necessity in every kind of organization, be it a nonprofit, a government, community based, political or business institution [2]. Fundamentally, strategic planning concerns itself with what an organization or community should do to improve performance. It can help non-profit organizations, as well as communities or other entities to deal with their changing environments and thus assist them to be more effective [3].

The benefits of strategic planning are: 1) environmental assessment, 2) rational basis for decision-making, 3) improvement of organizational performance, 4) awareness of weaknesses and strengths, capacity for growth, other opportunities and potential threats, 5) promotion of teamwork, learning and

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commitment, and 6) as an essential tool for good management and governance [4]. Therefore, strategic planning is very important for Catholic institutions to have direction, apt policies and procedures, improved performance, enhanced competitive advantage, efficient utilization of resources, to achieve objectives and attain set goals.

Literature Review

A strategic plan is a long-term plan for the formulation and implementation of organizational goals in an efficient and effective manner [5]. In 1974 at their meeting in Nairobi on "Planning for the Church in Eastern Africa in the 1980's," the Bishops of Eastern Africa noted the need for careful planning at all levels of the Church to promote effectiveness [6]. In 2018 the Congregation for the Institutes of Consecrated Life and Societies of Apostolic Life observed the need for a mind-set of planning, which starts from the spiritual and ecclesial experience and makes real the vision of the future through a strategic plan of action [7].

The Bauleni Street Kids Project Strategic Plan (2012 - 2016) also acknowledged lack of strategic planning as one of the challenges that the institution was facing [8]. In the Bible, Jesus Christ through several of his parables taught the importance of planning ahead (Mt 25: 14-30). Thus, the Church should use the knowledge of strategic planning and management principles to spread the Good News [9].

Moreover, every effective organization plans its future because it recognizes that change is constant and that adaptation to change is essential to its continuing life and fruitfulness [10]. For that reason, Church management needs to consider the benefits of developing a comprehensive strategic plan embracing both corporate level and connecting the plan to parish initiatives [11]. Furthermore, spiritual discernment must accompany strategic planning and decision-making, so that each project is welcomed and accompanied by the Holy Spirit. The Holy Spirit is pushing for the renewal of our strategies so that the Church optimally accomplishes its task [12].

Methodology

The philosophy underpinning this study is pragmatism. A pragmatic methodology provides the researcher with the opportunity to utilize a wide range of strategies or multiple methods to answer a research question, as well as different forms of data collection and analysis techniques that are envisioned to ably meet the researcher's needs and purposes to best understand the research questions [13].

Therefore, our research has dimensions of basic research (data collected to enhance knowledge), applied research (focuses on analyzing and solving real-life problems), problem oriented research (conducted to understand the exact nature of a problem to find out relevant solutions), problem solving research (conducted to understand and resolve problems), qualitative research (an inquiry process that helps create in-depth understanding of issues in their natural settings) and a quantitative research (a structured-numerical way of collecting data and analyzing it to draw conclusions).

Sampling and Data Collection

The study was conducted in seven (7) Catholic institutions in Lusaka, and some parts of Central Province. The sample size was 257. There were 252 questionnaires which were administered purposively and randomly to respondents in the first line, middle and top leadership and management positions, and 5 in-depth interviews were carried out on key informants purposively selected. Of the 252 questionnaires, 198 were answered and received back. This represents an overall response rate of 79% and a failure rate of 21%.

Data Analysis

Both quantitative and qualitative data were analyzed using excel and thematic methods respectively. This is because the type of data analyzed was largely numeric information gathered on scales of instruments and text

information recorded and reported during in-depth interviews [14]. As such, there was across database interpretation of statistical results and themes or patterns that emerged from the data [15].

Data analysis was determined by the research objectives and research questions. The presentation of data was done using tables because they are simpler to comprehend.

Results and Discussions of Findings

Strategic Planning in Catholic Institutions

Table 1 shows the responses of participants on the question: *'Does your institution have a strategic plan?'* The data indicates that slightly more than half (53.6%) of the respondents were affirmative that Catholic institutions had a strategic plan, while 46.4% had a contrary view.

Table 1. Does your Institution have a Strategic Plan?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	52	20.6	27.8	27.8
	Yes	135	53.6	72.2	100.0
	No response	65	25.8	100.0	-
	Total	252	100.0	-	-

Furthermore, 2 (25%) out of 5 of the key informants said the same. An average of 37.7% (46.4% + 25%) of the participants in the survey said that Catholic institutions did not have a strategic plan. Therefore, many Catholic institutions did not have a strategic plan.

Activities Implemented Based on the Strategic Plan

Table 2 indicates that less than half (35.3%) of the participants were of the view that institutional activities were implemented based on the strategic plan and 64.7% of the respondents had a contrary view.

Table 2. Are the Activities Implemented Based on the Strategic Plan?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	75	29.8	45.7	45.7
	Yes	89	35.3	54.3	100.0
	No response	88	34.9	100.0	-
	Total	252	100.0	-	-

Furthermore, 3 (75%) of the 5 key informants said that the institutions were guided by strategic plans, and 2 (25%) said that they were guided by other means such as annual plans and induction manuals. We can surmise that an average of 44.9% (64.7% + 25%) of the respondents said that Catholic institutions were not guided by a strategic plan. Therefore, almost half of Catholic institutions in Zambia were not guided by a strategic plan.

Table 3. Summation of Findings on Key Research Variables

S.No	Variable Category	Quantitative	Qualitative	Average Percent	Percent Rate
1	Strategic planning	53.6%	75%	64.3%	Above 50%
2	Implementation of strategic plan	35.3%	25%	30.3%	Below 50%
3	Clear vision	57.9%	100%	76.4%	Above 50%
4	Self-financial capacity	47.6%	25%	36.3%	Below 50%

5	Established policies and procedures	40.9%	Not clear	20.5	Below 50%
6	Adaptable to change	55.5%	75%	65.3	Above 50%

Table 3 shows that there was inadequate proficiency in Catholic institutions due to inadequate strategic planning. This led to unclear vision, vague policies and procedures, insufficient financial capacity and inability to adapt to changing times.

Practical Implications

Management audit is a comprehensive assessment of management processes and practices of an organization. It involves the review of managerial aspects such as organizational objectives, policies, procedures, structure, and control systems to ascertain the efficiency of the management over the activities of the firm [16]. Therefore, Catholic institutions need management audit if they are to perform proficiently. Strategic management is the ongoing planning, monitoring, analysis and assessment of all necessities an organization needs to meet its goals and objectives [17]. Through strategic management, Catholic institutions can improve strategic planning and therefore perform adeptly. Leadership and management development is a planned and deliberate process to help leaders and managers become more effective; ensuring that an organization meets its current and future needs for effective leaders and managers [18]. If they are to have the capacity for strategic planning, leaders and managers in Catholic institutions need capacity building in leadership and management development.

Recommendations

To Enhance Strategic Planning for High - Performance of Catholic Institutions in Zambia, there is a need to:

1. Do management audit of all institutions.
2. Build capacity of leaders and managers in strategic management.
3. Implement leadership and management development system.

Conclusion

Strategic planning is a powerful means of positioning an organization within its competitive sphere. The drivers of strategic planning are scarcity of available resources, change and competition in the external environment of an organization. Therefore, management audit, strategic management, and leadership and management development system would address the challenge of strategic planning in Catholic institutions in Zambia and enable them to perform optimally.

Conflict of Interest

Though this was both action research as well as a multiple case study, the author has not declared any conflict of interests.

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Topological Relation Aware Transformer

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Abstract

We present a Topological Relation Aware Transformer (T-RAT), a specialized head transformer to open sets, an element of the topology τ *generated by the set S, the set of all pre-existing relations between input tokens of the model. From this topological space* (S, τ)*, we present the way to spread each open set to one head of our Transformer. T-RAT improves exact match accuracy in Text-To-SQL challenge (62.09%) without any enhancement of large language models compared to the baseline models RAT-SQL (57.2%) and Light RAT-SQL (60.25%).*

Keywords: *Deep learning, Natural Language Processing, Neural Semantic Parsing, Relation Aware Transformer, RAT-SQL, Text-To-SQL Transformer.*

Introduction

In Text-To-SQL [1-9], The Light RAT-SQL [8] shows the way to reduce the number of preexisting relations in the RAT-SQL framework [7] by preserving the exact match accuracy without any enhancement of pre-trained (LLMs) large language models [10-15]. The limitation of this method is that it can not be suitable for the scenario where we have a lot of pre-existing relations. Since each head in multi-head self-attention must be specialized to at least one relation, we will have a model with high dimensions.

Another con is that Light-RAT-SQL suffers from *over-alignment* as we can see in Figure 1, there is more unnecessary attention on column **"*",** the same with RAT-SQL the column horsepower getting so much attention.

To fix this, we present a new model, the Topological Relation Aware Transformer(T-RAT) inspired by the Topology theory and Relation Aware Transformer [1, 7] where we improve the "spreading algorithm" presented in Light RAT-SQL.

The Topological Relation-Aware Transformer (T-RAT) is a specialized head transformer designed to address the problem of semantic parsing of natural language to SQL queries, particularly in the context of database query tasks. In this paper, we present a novel approach to leveraging the inherent relations between tokens, such as those between natural language questions and database schema elements, to improve the accuracy of text-to-SQL query generation models. T-RAT is built on the foundation of topology theory and Relation Aware Transformer (RAT), which improves the capacity of multi-head self-attention models to capture diverse and contextually relevant relationship patterns within complex data. Our proposed method spreads each open set to one head of the Transformer, enabling the model to capture nuanced relationships between input tokens and improve the accuracy of text-to-SQL query generation.

We believe that RAT-SQL overfits because of many preexisting relations, and Light RAT-SQL misaligned some tokens due to few relations and mixing forward and backward edges.

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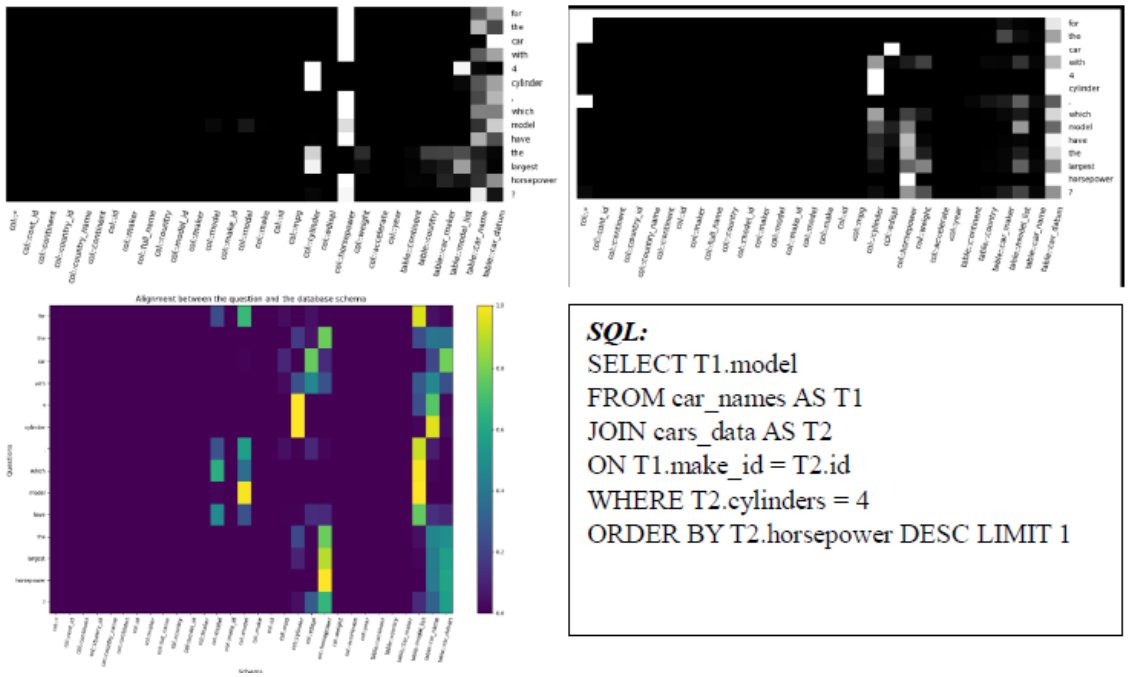

Figure 1. Alignment between the Question "For the Cars with 4 Cylinders, which Model has the Largest Horsepower" and the Database Car_1 Schema (Columns and Tables)

Up-Left: The RAT-SQL – Up-Right: Light RAT-SQL and bottom-left: T-RAT

So, this question remains open: How can the inherent relations between tokens, such as those between natural language questions and database schema elements, be effectively leveraged to improve the accuracy of text-to-SQL query generation models?

The inherent relations between tokens, such as those between natural language questions and database schema elements, can be effectively leveraged to address the problem of semantic parsing of natural language to SQL queries. We hypothesize that by spreading each open set to one head of the Transformer, the T-RAT model can capture nuanced relationships between input tokens, leading to improved accuracy in text-to-SQL query generation models. Additionally, we believe that the topology structure of the pre-existing relations enhances the capacity of multi-head self-attention models to capture diverse and contextually relevant relationship patterns within complex data. This will help to have feature diversification and learning complementary information, ultimately improving the overall accuracy of text-to-SQL query generation models. This hypothesis forms the basis for our exploration of the T-RAT model and its potential to effectively address the challenges of semantic parsing in the context of natural language to SQL queries.

Our contribution and key findings:

1. We present a way to leverage preexisting relations between input tokens in Text-To-SQL to improve the exact match accuracy of RAT-SQL, Light RAT-SQL (without any enhancement of the pre-trained large language models).
2. The topology structure of the pre-existing relations enhances the capacity of multi-head self-attention models to capture diverse and contextually relevant relationship patterns within complex data. This will help to have feature diversification and learning complementary information. So, improving the overall accuracy.
3. By tailoring each head to different elements of the topology, it facilitates a more detailed and nuanced understanding of relationships in the input data, making it a valuable tool in NLP tasks.

A detailed description of the T-RAT model has been presented so far, including the algorithms used to encode and process input data and demonstrate its effectiveness in addressing the problem of semantic parsing of natural language to SQL queries. Our experimental results show that T-RAT achieves higher exact match accuracy compared to baseline models RAT-SQL and Light RAT-SQL.

Overall, T-RAT presents a promising approach to addressing the problem of semantic parsing of natural language to SQL queries in low-resource settings, and our proposed method of spreading open sets through heads provides a valuable tool for capturing nuanced relationships between input tokens.

Related Work

Text-To-SQL

The exploration of Text-to-SQL conversion employing deep learning techniques has witnessed considerable advancements, driven by the expressive power and adaptability of neural network architectures. This section provides an overview of the related work in the domain, highlighting key developments and methodologies.

Sequence-to-Sequence Models

Early forays into leveraging deep learning for Text-to-SQL predominantly featured sequence-to-sequence models [2, 16]. These models, inspired by their success in machine translation, were adapted to map natural language utterances to SQL queries. The encoder-decoder architecture facilitated the capturing of complex linguistic structures, yet challenges persisted in handling the semantic intricacies inherent in SQL generation.

Attention Mechanisms

The integration of attention mechanisms [17-21] marked a significant enhancement in capturing dependencies within the input sequence. Attention mechanisms allowed models to focus on specific parts of the input when generating corresponding SQL tokens, improving the overall contextual understanding. Noteworthy works, such as SQLNet [4, 6, 16], introduced attention mechanisms tailored for the Text-to-SQL task.

Pre-trained Language Models

The rise of pre-trained language models [10-12], [22-24], such as BERT [14, 25-28] and GPT (Generative Pre-trained Transformer) [13, 15], has had a transformative impact on various natural language processing tasks, including Text-to-SQL. Fine-tuning these models for SQL generation tasks demonstrated substantial gains in capturing nuanced linguistic patterns and semantic relationships. GP [29], GAP [30], GRAPPA [31], STRUG [32] are among Pretraining Text-To-SQL.

Semantic Parsing Techniques

Advancements in semantic parsing [33-36] have played a crucial role in refining Text-to-SQL models. Techniques incorporating semantic role labeling and syntax-aware parsing have been explored to imbue models with a deeper understanding of the underlying semantics, enabling more accurate SQL query generation.

Graph-Based Semantic Parsing

Graph-based methods [1, 37-43] have gained prominence for their ability to represent complex relationships and dependencies within a sentence. Dependency graphs or semantic graphs are constructed to capture the syntactic and semantic connections between words. Nodes in the graph correspond to words, and edges encode grammatical or semantic relationships. Graph-based methods facilitate a holistic understanding of sentence structure, enabling effective extraction of formal semantic representations for subsequent processing.

Cross-Domain Adaptability and Multilingual Text-to-SQL

Recent efforts have been directed towards enhancing the adaptability of Text-to-SQL

models across diverse domains and linguistic variations. Enhanced by GPT-4 [44], these models [45, 46] perform high accuracy and are now SOTA in most benchmark.

The availability of high-quality datasets is crucial for training, evaluating, and benchmarking models.

Various datasets have been created to address the complexity of mapping natural language queries to SQL queries accurately: ATIS, Spider, WikiSQL, CoSQL, etc. [47-61].

In summary, the evolution of Text-to-SQL with deep learning has witnessed a shift from traditional sequence-to-sequence models to sophisticated architectures incorporating attention mechanisms, pre-trained language models, and hybrid learning strategies. Ongoing research continues to explore innovative approaches to improve model accuracy, generalization, and adaptability across diverse linguistic and database contexts.

Topology on a Set

Formally, let S be a set and let τ be a family of subsets of S. Then τ is called a topology on S if:

1. Both the empty set and S are elements of τ.
2. Any union of elements of τ is an element of τ.
3. Any intersection of finitely many elements of τ is an element of τ.

If τ is a topology on S, then the pair (S, τ) is called a topological space.

The members of τ are called open sets in S.

If the complement of a subset of **S** is in τ, then the subset is considered closed; that is, its complement is open. A subset of **S** can be neither, both (a clopen set), open, or closed. There is always a closed and an open set, the empty set and **S** itself. A neighborhood of **S** is an open subset of S that includes the point **s** [62].

RAT-SQL

The text-to-SQL encoder should be able to encode database relations in such a way that the semantic parser and model alignment between the database schema and the given query are optimized.

How the inputs (schema: tables & columns, and question) are simultaneously encoded is critical for generalization purposes for unknown database structures.

The RAT-SQL framework [7], built on the relation-aware self-attention mechanism [20] and pointer networks [18], solves the Text-to-SQL challenge's generalization problem.

The relative position distance in input tokens is used as the graph's edge in relation-aware self-attention [18], whereas RAT-SQL uses an embedding of abstract type of existing relations between tokens.

However, both bias the self-attention equation in the same way to inject the graph's edges into their model.

Equations of relation-aware self-attention:

$$e_{i,j}^{h} = \left(\frac{(XW^{q}(XW^{k}+R_{k})^{T})}{\sqrt{d_{k}}}\right) \quad (1)$$

$$\alpha_{i,j}^{h} = softmax(e_{i,j}^{h}) \quad (2)$$

$$z_{i}^{h} = \sum_{v} \alpha_{i,j}^{h} (XW^{v} + R_{v}) \quad (3)$$

where matrices W^{q}, W^{k}, *and* W^{v} are trainable parameters in self-attention.

R_{k} and R_{v} are embedding learned from the abstract relations of the input graph in the key space and value space of the transformer [17].

Methods

The Topological Relation Aware Transformer (T-RAT) is a specialized head transformer designed to address the problem of semantic parsing of natural language to SQL queries, particularly in the context of database query tasks. T-RAT achieves this by leveraging the topology structure of pre-existing relations between input tokens and spreading each open set to one head of the Transformer.

T-RAT uses a direct graph to represent the pre-existing relations between input tokens, such as syntax dependency in question tokens, schema linking between the question tokens and column/table tokens, and schema encoding in column and table tokens.

The direct graph consists of different edges that describe the relationships between the tokens, such as forward and backward syntax dependency, value-based linking, name-based linking, foreign key linking, and primary key linking.

T-RAT then uses multi-head self-attention as in the baseline model (Light RAT-SQL) to tailor each head to different elements of the topology, facilitating a more detailed and nuanced understanding of relationships in the input data.

This allows T-RAT to capture diverse and contextually relevant relationship patterns within complex data, leading to improved accuracy.

Problem Definition (Text-To-SQL)

Given a natural language question $\mathbf{Q=q1\ldots q_{|Q|}}$, a database schema $\mathbf{S = <C, T>}$ with columns $\mathbf{C=\{c1,\ldots, c_{|C|}\}}$ and tables $\mathbf{T=\{ t1,\ldots, t_{|T|}\}}$

The objective of text-to-SQL is to predict the SQL query $\boldsymbol{y}$ from the input $<\mathbf{Q, S}>$

The most used model in such a challenge is an encoder and decoder architecture pattern with attention mechanisms between the encoder and decoder.

The encoder encodes input as graph $\mathbf{G=<V, R>}$ where $\mathbf{V=Q\ U\ T\ U\ C}$ are nodes of types { **Q, T, C** } The initial embedding matrix X $\mathbf{R^{Vxd}}$, [**V = Q+T+C,** and **d** is the dimension model] is flattened and the edge $\boldsymbol{R}$ is the known relation between two input tokens.

In this work, our proposed method improves the encoder side, especially, the existing RAT-SQL model [8, 7]. Please refer to [33, 34, 62] works for a thorough description of the decoder side.

Relations in T-Rat: Open Heads

Given a set S = {Question, Linking, Schema} Where each element of S is a set of indexes and each index represents an edge type in the direct graph G.

1. Question= {1, 2}
2. Linking = {3, 4, 5, 6}
3. Schema= {7, 8, 9,., 16}

Table 1. gives more details about each index, the name of the abstract edges, the set where the index belongs, and the description of the edge.

The topology generated by a set **S** of sets can be thought of as the set of all possible unions of elements from the sets in **S**, including the empty set.

The topology generated by **S** would consist of all possible unions of elements from **Question, Linking, Schema,** as well as the empty set.

So, the topology generated by **S** would include:

1. The empty set: ∅
2. The sets Question, Linking, and Schema individually.
3. The unions of pairs of sets, such as Question ∪ Schema, Question ∪ Linking, and Schema ∪ Linking.
4. The union of all three sets: Question ∪ Linking ∪ Schema.

This topology represents all the possible combinations and subsets that can be formed by taking elements from the sets **Question, Linking, and Schema**, including the individual sets and the empty set.

This generated topology has 8 elements, and each head of T-RAT will be specialized to one open set. For example: suppose that the second head will be specialized to the open set "**Question**" That means this head will learn only: *SD-forward* and *SD-backward* because these are 2 edges in this open set as described in Table 1.

Algorithms

Figure 2. Shows different modules and components involved in T-RAT.

Algorithm 1: Building Open Sets

This algorithm initializes a list to represent different sets such as "Question," "Schema," and "Linking." It then creates a list of indices to map the indices of edges corresponding to each set, effectively building open sets for the input data.

Algorithm

1. Initialize a list **S** to represent different sets such as "Question," "Schema," and "Linking."
2. Create a list of R_indices to map the indices of edges corresponding to each set:
   a. For "Question," the indices are [1, 2].
   b. For "Schema," the indices are [7, 8, 9, 10, 11, 12, 13, 14, 15, 16].
   c. For "Linking," the indices are [3, 4, 5, 6].
3. Define a list **set_combinations** to store all possible combinations of these set indices, creating a topology (excluding the empty set):
   a. Generate combinations from R_indices of size 1, 2, and 3 to encompass all possible combinations.

The time complexity of Algorithm 1 is $O(n)$, where n is the number of elements in the sets "Question," "Schema," and "Linking." The algorithm iterates through the elements of the sets to initialize the list R and create a list of R_indices, which involves simple iteration and mapping operations.

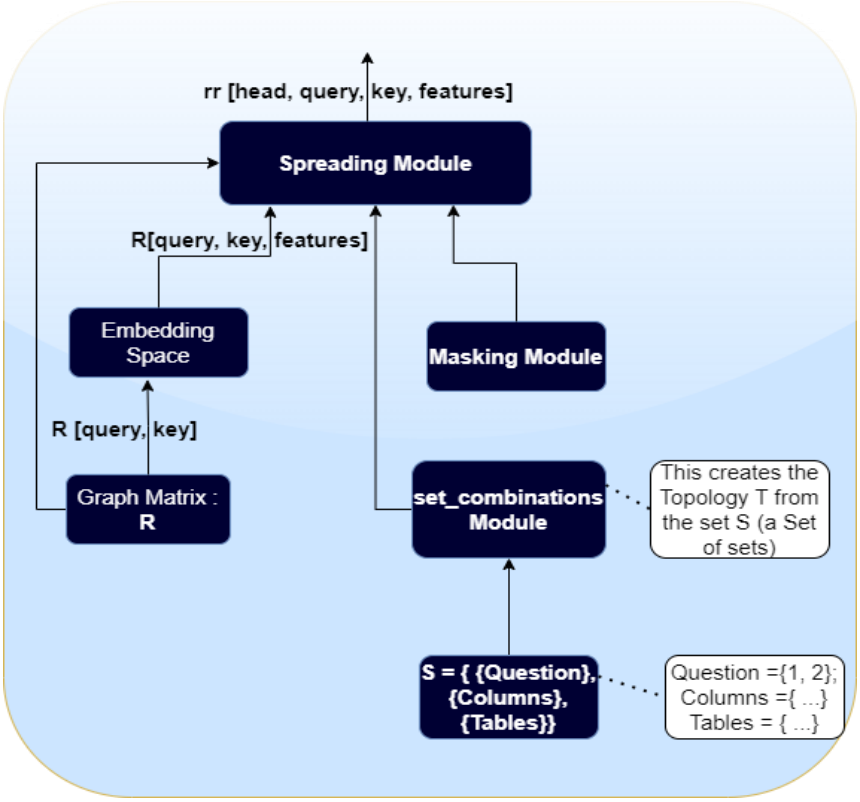

Figure 2. Different Modules of Spreading Open Sets through Heads

The space complexity of Algorithm 1 is O(n), as it requires space to store the sets "Question," "Schema," and "Linking," as well as the lists R and R_indices.

Algorithm 2: Masking Function

The masking function takes three parameters: relation, space_embedding, and set_indices. It initializes a mask tensor with the same shape as the relation and sets it to all zeros. It then iterates through each index in set_indices, checks if the relation is equal to space_embedding[i], and accumulates these matches into the mask.

Algorithm

1. Define a masking function that takes three parameters: relation, space_embedding, and set_indices.
2. Initialize a mask tensor with the same shape as the relation and set it to all zeros.
3. Iterate through each index i in set_indices:

a. Check if the relation is equal to space_embedding[i] and accumulate these matches into the mask.

4. Return the resulting mask.

The time complexity of Algorithm 2 is O(n), where n is the number of elements in the set_indices list. The algorithm iterates through the set_indices list to check if the relation is equal to space_embedding[i] and accumulates these matches into the mask. This involves simple iteration and comparison operations.

The space complexity of Algorithm 2 is O(m), where m is the size of the relation tensor. The algorithm requires space to store the mask tensor, which has the same shape as the relation tensor.

Table 1. Description of Different Edges in Direct Graph used in T-RAT

Index	Edge label	SET	Description	X	Y
1	SD-forward	Question	**Y** is the source word of **X** under syntax dependency	Q	Q
2	SD-backward		**Y** is the target word of **X** under syntax dependency	Q	Q
3	VBL forward	Linking	Value-based-Linking forward: question **X** references any values found in the database and so participates in the SQL query	Q	C
4	VBL backward		Value-based-Linking backward: question **Y** references any values found in the database and so participates in the SQL query	C	Q
5	NBL forward		Name-based linking forward refers to exact or partial occurrences of either the table name or Column name **Y** in question **X**	Q	T or C
6	NBL backward		Name-based linking backward refers to exact or partial occurrences of either the table name or Column name **X** in question **Y**	T or C	Q
7	FK-Forward	Schema	The table **X** has a column **Y** as a foreign key	T	C
8	FK-Backward		The column **X** is a foreign key to the table **Y**	C	T
9	DF-Forward		There is a functional dependency between Column **X** and Column **Y**	C	C
10	DF-Backward		There is a functional dependency between Column **Y** and Column **X**	C	C
11	Belong-To-Forward		Column **Y** belongs to Table **X**	T	C
12	Belong-To-Backward		Column **X** belongs to Table **Y**	C	T
13	PK-Forward		Column **X** is the primary key of Table **Y**	C	T
14	PK backward		Column **Y** is the primary key of Table **X**	T	C
15	TT-forward		Table **X** and Table **Y** are linked by a foreign key	T	T
16	TT-backward		Table **Y** and Table **X** are linked by a foreign key	T	T

The index 0 is linked to “None”, the edge label describing that there is no linking between two tokens. Q: Question | T: Table | C: Column

Algorithm 3: Spreading Open Sets Through Heads

This algorithm operates by initializing dimensions based on the shape of relations and the number of heads in the model. It then creates an empty tensor and, for each head, creates a mask using the masking function with specific set indices. It multiplies the relation tensor by the mask and stores the result, effectively spreading open sets through heads to specialize the relations in the model.

Algorithm

Given:

1. A tensor of relations: relations.
2. Embeddings Space: space_embedding.
3. Algorithm1. Combinations representing the topology: set_combinations.
4. Algorithm 2. Masking module.

The algorithm operates as follows:

1. Initialize dimensions: q, k, f based on the shape of relations.
2. Initialize "head" based on the number of heads in the model.
3. Create an empty tensor rr with dimensions (head, q, k, f).
4. For each head i:
   a. If i=0:
      i. Create a mask using the masking function with only the index 0.
      ii. Multiply the relation tensor relations by the mask and store it in rr [i].
   b. Else:
      i. Retrieve the set of indices set_indice from set combinations[i−1].
      ii. Create a mask using the masking function with set_indices.
      iii. Multiply the relation tensor relations by the mask and store it in rr[i].
5. Return the tensor rr representing the relations with specialized heads.

In Algorithm 3, the Embeddings Space denoted as "space_embedding," refers to the embeddings of the abstract type of existing relations between tokens. These embeddings are learned during the training process and are used to represent the abstract relationships between the input tokens in the direct graph used by T-RAT. The space_embedding is used in the masking function to check if the relation between two tokens matches a specific type of relationship represented by an index in the set_indices list. If the relation matches the type of relationship represented by an index, the corresponding element in the mask tensor is set to 1, indicating that the relation should be included in the output tensor rr.

The time complexity of Algorithm 3 is $O(h * n^2)$, where h is the number of heads in the model and n is the number of elements in the set_combinations list. The algorithm iterates through each head and "sets combination" to create a mask using the masking function and multiplying the relation tensor by the mask. This involves nested iteration and multiplication operations.

The space complexity of Algorithm 3 is $O(h * m^2)$, where m is the size of the relation tensor. The algorithm requires space to store the rr tensor, which has dimensions (head, q, k, f), and the mask tensor, which has the same shape as the relation tensor.

These algorithms are integral parts of the proposed Topological Relation-Aware Transformer (T-RAT) model and are designed to handle the encoding and processing of input data, particularly in the context of text-to-SQL tasks and relation-aware self-attention mechanisms.

Experiments

Dataset

The dataset used is Spider [50]. Spider is a comprehensive text-to-SQL dataset annotated by 11 Yale students, aiming to facilitate the development of natural language interfaces for cross-domain databases. The dataset comprises 10,181 questions and 5,693 unique complex SQL queries, spanning 200 databases with multiple tables across 138 domains. Spider presents a challenge by featuring diverse SQL

queries and databases in both training and testing sets, requiring systems to excel in generalization to new queries and database schemas. More details about Spider dataset: https://yale-lily.github.io/spider.

Implementation

The same architecture as in the RAT-SQL and Light RAT-SQL with the Spider dataset where we applied Algorithm 3 before computing the relation aware self-attention to make pre-existing relations specialized through heads.

The tokens (questions, column names, and table names) are tokenized and lemmatized using the Stanford NLP toolkit [63].

We use pre-trained word embeddings Glove [64] and then each part (question, columns, tables) is processed with bidirectional LSTMs [65] with 128 hidden sizes with a dropout with a rate of 0:2. On the top of this layer, we have 8 T-RAT layers.

The same configuration as RAT-SQL is used for T-RAT, we set **dx = dz = 256, H = 8**, and employ dropout with a rate of 0:1.

The inner layer dimension of the position-wise feed-forward network is 1024. We use rule embeddings of size 128, node type embeddings of size 64, and a hidden size of 512 inside the LSTM with a dropout of 0:21 inside the decoder.

Hyperparameter

The code was implemented in Pytorch[66] The training is done with Adam [67] as an optimizer with default hyperparameters. We use a batch size of 20 and train for up to 40,000 steps.

Results

The experimental results from Table 2 demonstrate compelling evidence of the enhanced performance of T-RAT models in comparison to the baseline Light RAT-SQL and RAT-SQL model, particularly on the test set of the Spider dataset.

Specifically (in a setting without any enhancement of Pre-trained LLMs), T-RAT achieves an accuracy of 62.09%, while Light RAT-SQL achieves an accuracy of 60.25%, surpassing the accuracy of RAT-SQL, which stands at 57.2%.

These findings underscore the efficacy of the proposed enhancements in T-RAT for improving the accuracy of text-to-SQL query generation models.

By outperforming the baseline RAT-SQL model on the challenging test set of the Spider dataset, T-RAT exhibits promising potential in addressing the complexities of semantic parsing in natural language processing tasks.

We ran 5 random experimentations of T-RAT-SQL, Light RAT-SQL, and RAT-SQL without any pre-trained Large Language Models for comparison purposes (cf. Figure 3).

Table 3 shows the confidence interval of each model, and we fail to reject H_0 for RAT-SQL and Light RAT-SQL but there is strong evidence against H_0 ($p<0.001$) for RAT-SQL and T-RAT.

Table 2. Accuracy of the Spider Dataset

Model	**Dev**	**Test**
(Without any enhancement of a Pretrained Large Language Model: BERT, ELECTRA, etc.)		
IRNet [68]	53.2	46.7
Global-GNN [39]	52.7	47.4
IRNet V2 [68]	55.4	48.5
RAT-SQL [7]	62.7	57.2
Light RAT-SQL[8]	-	60.25
Our model (T-RAT)	-	62.09

the same ($p=0.0047$) for Light RAT-SQL and T-RAT.

Table 3. Test Set Accuracy (and 95% confidence interval) of T-RAT, RAT-SQL, Light RAT-SQL

Model	Accuracy
T-RAT	61.58 ± 0.66
Light RAT-SQL	58.99 ± 1.04
RAT-SQL	58.90 ± 0.50

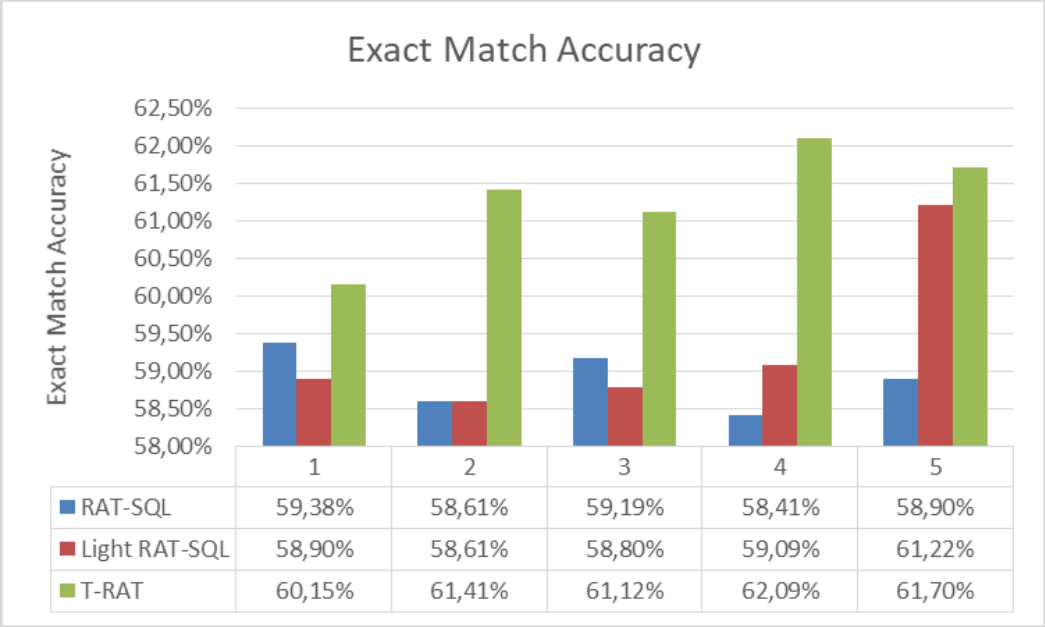

Figure 3. Exact Match Accuracy of RAT-SQL, Light RAT-SQL, and T-RAT

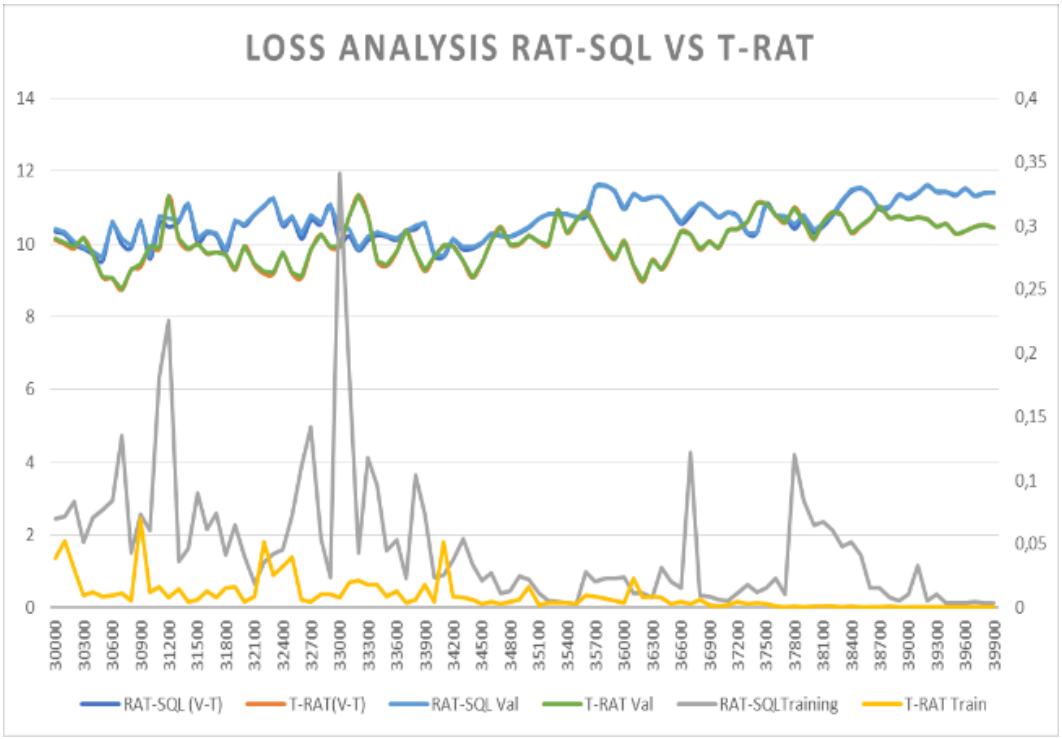

Figure 4. Loss Comparison between RAT-SQL and T-RAT

Discussion

Regularization

Topology-induced feature mixing, serving as a regularization mechanism, plays a pivotal role in mitigating overfitting within the model. By subjecting the model to an extensive array of patterns and relationships, this form of regularization diminishes the likelihood of the model memorizing the training data excessively. Instead, it fosters a propensity for the model to generalize adeptly when confronted with previously unseen data.

In Figure 4, the cross-validation loss of RAT-SQL and T-RAT is depicted (on the left y-axis). The discernible divergence in the cross-validation loss between the two models suggests that the incorporation of topology-induced adjustments in T-RAT has effectively curtailed overfitting tendencies, thereby promoting superior generalization compared to RAT-SQL. The nuanced alterations guided by the topology-induced regularization contribute to the model's enhanced capacity to extend its predictive capabilities beyond the confines of the training dataset.

Stability

Learning stability refers to the robustness and consistency of a machine learning model's performance across different training runs or datasets. A stable learning process implies that the model's behavior remains relatively consistent and reliable, even when subjected to variations in training data, initial conditions, or hyperparameter settings.

In scrutinizing the learning curves of the model over epochs or iterations, as presented in Figure 4 (corresponding to the right y-axis), it becomes evident that the T-RAT learning curve exhibits greater stability compared to RAT-SQL. The T-RAT model consistently converges across multiple instances of training runs, reflecting a heightened degree of reliability in its learning dynamics.

Alignment And Sensitivity

The graphical representation of the alignment generated by RAT-SQL, Light RAT-SQL, and T-RAT is illustrated in Figure 1. A nuanced examination of T-RAT reveals an enhanced sensitivity to Schema Linking, exemplified by the discernible manifestation of unwarranted attention between the "model_list" table and the token "model." This observation underscores the model's pronounced responsiveness to the intricacies of schema-linking relationships within the input structure. It is imperative to underscore that the manifestation of superfluous attention underscores the need to temper the schema-linking inductive bias[69]. As this bias is mitigated, an anticipatory improvement in the model's overall behavior is anticipated. Reducing the schema-linking inductive bias is thus posited as an essential strategy for enhancing the model's discernment and performance.

Conclusion

The Topological Relation Aware Transformer (T-RAT) is a specialized head transformer designed to address the problem of Text-To-SQL. T-RAT achieves this by leveraging the topology structure of pre-existing relations between input tokens and spreading each open set to one head of the Transformer. This specialization enables the model to capture diverse and contextually relevant relationship patterns within complex data, leading to improved accuracy. T-RAT also utilizes topology-induced feature mixing and an improved spreading algorithm to address the limitations of misalignment of tokens.

Experimental results demonstrate that T-RAT achieves higher exact match accuracy compared to baseline models RAT-SQL and Light RAT-SQL. The improved accuracy is attributed to the specialized head transformer and the effective utilization of pre-existing relations within the topology. It presents a promising approach to improving the accuracy

of text-to-SQL query generation models in low-resource settings.

Limitations

T-RAT-SQL was not enhanced with large language models such as GPT, BERT, or ELECTRA since this requires large GPU resources that we do have not. Enhancing our proposed model with other LLMs can be crucial to determining its effectiveness with competitive SOTA models.

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Conflict Of Interest Statement

All authors declare that they have no conflicts of interest.

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How the Learning Disabilities Cause Psychosocial Problems among children in South Sudan: A Case of Jamjang Refugee Camps

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Abstract

The study on the learning disabilities and associated psychosocial problems among children in South Sudan started in 2022 to 2024. The deepening loneliness and vulnerability of the children with the learning disabilities that influence the psychosocial problems among children resulted from the conflict in Sudan, which scattered families, social fabric, community structures, and pushed the families to seek international protection. The families have limited access to livelihood and highly dependent on relief services that exacerbate the situation for nurturing children. The study aimed at ascertaining the presence of the learning disabilities, associated psychosocial problems and the ways to mitigate and address a growing phenomenon among refugee children in Jamjang camps. The study employed qualitative, quantitative, and ethnographical/anthropological method to explore the growing phenomenon. The tools used in the design includes questionnaires, interviews, and observations. The study ascertained the presence of the learning disabilities among children which consists of dyslexia, dysgraphia, dyscalculia, attention deficit hyperactivity disorder, auditory processing disorder, visual and perceptual disorder. These conditions were manifested in deficiency to write, spell, comprehend, articulate written point, grammatical errors, arithmetic calculation, and inattention. The study confirmed how the learning disabilities cause the psychosocial problems which includes low self-esteem, lack of confidence, anxiety, depression, posttraumatic stress disorder, bully, stigma, and neglect. The finding confirmed the phenomenon can be addressed through mental health support, multisensory approaches, and Skinner's Operant conditioning theory; Cognitive Behavioral theory of Bandura are crucial in reducing the adverse effects of the phenomenon.

Keywords*: Anxiety, Dyslexia, Depression, Dysgraphia, Learning Disabilities, Psychosocial.*

Introduction

The learning disability is one of the learning deficiencies growing among the refugee children in South Sudan. The arise of childhood neurological damage come as a result of the children exposure to overwhelming and devastating armed conflicts where they also do not have access to the rehabilitative educational services.

The specific learning disability is a psychological disorder in one or more areas that involves understanding, use of language both spoken and written which may be manifested in the difficulty to listen, think, read, write, spell, or do arithmetic calculation. It also includes perceptual disability, brain injury, dyslexia, and developmental aphasia [1]. The learning deficit consists of the impairments in one or more processes related to perceiving, thinking, remembering, or learning, which includes

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language processing; phonological processing; visual spatial processing; processing speed; memory and attention; and executive functions such as planning and decision-making [2]. The learning disabilities are heterogeneous group of conditions with a deficit in processing language, and manifested in difficulty to comprehend, speak, read, write, spell, or do mathematical calculations, including perceptual disabilities, dyslexia, dysgraphia, dyscalculia, dyspraxia, and developmental aphasia. Learning disability is a neurological learning disorder which consists of dyslexia, dysgraphia, and dyscalculia [3]. The learning disability is largely centered on the children who appeared normal in many intellectual skills, but also exhibits variety of the cognitive limitations that interfere with their ability to read, write, and learn in the classroom. Some children with specific learning disabilities have deficits in the basic psychological processes that interfere with learning and academic achievement, and lead to emotional and behavioral problems [4]. Many people with disabilities have considerable multiple physical, and mental health conditions that increased risk of developing chronic conditions that affects how a person learns new skills, understand information, and communicate throughout their lifetime. The study of learning disabilities focused on two main profiles which comprised of the clinical views that are related to problems in language abilities, manifested in difficulties in reading and writing. while the other problem is concerned with the nonverbal aspects, where the children have difficulties in the acquisition of complex motor movement, low coordination, poor balance, and postural control, decreased muscle tone, below average fine motor ability, having arithmetic difficulties, and spatial problem solving, with possible linguistic difficulties in the productive domain [5].

The neurological disorders affect the learners' ability to either interpret what people see and hear or store information from distinct parts of the brain, and impede learning to read, write, or do calculable work and acquiring basic academic skills. However, the study suggests similarities between Asperger syndrome and learning disabilities that include a normal range of intelligence, uneven profile of skills, language difficulties, social and interpersonal deficits, cognitive disorganization, academic and interpersonal problems [6]. The specific learning disorder is elucidated as difficulties in learning and using academic skills with presence of one of the following symptoms that have persisted for not less than 6 months, despite the provision of interventions that target those difficulties. These include inaccurate, slow, and effortful word reading, difficulty in comprehension of the meaning of what the word read, spell, written expression, mastering number sense, number facts, calculation, difficulties with mathematical reasoning. The affected academic skills are below the expected individuals chronological age, and cause significant interference with academic performance, and daily activities. These include intellectual disability, uncorrected visual, auditory acuity, other mental and neurological disorders, psychosocial adversity, lack of proficiency in the language of academic instruction, deficits in spelling, grammar and punctuation accuracy, and organization of written expression [7].

Dyslexia

Dyslexia is a condition of neurological learning disorders which affects learning particularly reading, writing, spelling, comprehension and language processing skills, decoding, poor memory, writing, spelling, and identification of individual sound within word [4]. The term specific learning disability refers to a disorder in one or more of the basic psychological processes which involved understanding or using spoken, and written language, which may be manifested in the inability to listen, think, speak, read, write, spell, or do mathematical calculations, perceptual disabilities, brain injury, dyslexia, and developmental aphasia [8]. While dyslexia conditions are characterized by literacy-related

problems which are not related to low intelligence, socioeconomic status or emotional problems but go beyond the phonological deficit and show a range of broader cognitive difficulties affecting memory, attention, and executive function. The individuals exhibit difficulties with recognition of hidden shapes, poor ability to shift the focus of attention, and deficits in aspects of working memory in spoken and written language. The common characteristics of dyslexia include difficulty identifying rhyming words, or counting syllables in words, difficulty with hearing and manipulating sounds in words, distinguishing different sounds in words, learning the sounds of letters. Poor reading comprehension during oral and silent reading, often because the words are incomprehensibly read [9].

There is empirical evidence for temporal processing deficits in many disabled readers, particularly in the individuals with developmental dyslexia because the dyslexics require longer interstimulus intervals to separate two consecutively presented tones. Furthermore, children with developmental aphasia and developmental dyslexia exhibit difficulties to discriminate the sequence order of two tons of different frequencies which are presented with short temporal processing deficits were also found in the visual modality [10]. The interventions that improve the reading skills for children with dyslexia also improve the reading skills of all children in school because these curricula involve systematic, explicit phonics instruction. Decades of studies on the science of reading instruction show that word reading skills are attained through explicit, systematic phonics instruction for all the children. The study found one fifth of Swedish university students with dyslexia required additional time to complete their degrees, while other learners were able to progress at a normal pace [5]. Similarly, the study reported 40% of dyslexic learners who completed studies in UK higher education obtained first-class or upper second-class honors, which was lower than the rate of about 50% for students without disabilities [11]. Several people with dyslexia have not been successful, however few successful dyslexic individuals can change the world as witnessed in the case of Bill Gates and Albert Einstein, the famous personalities, who were recognized as dyslexic individuals. In Malaysia, 10% to 15% of primary school learners are reported to be dyslexic of which, a teacher ought to be an expert and creative in educating learners, including special needs education learners [12].

Dysgraphia

Several families in refugee camps are disrupted by harsh situation which forces the affected children to acquire poor neuromotor noise management. There is considerable concern that many school-aged students do not acquire strong writing skills as evident in the Americas, Europe, Asia, and Africa, where researchers reported that students' narrative, practical and expository writing to be often impoverished in content and incomplete in construction, containing many errors involving handwriting, punctuation, grammar, and rhetoric [13].

The motor dysgraphia causes deficient of fine motor skills of which the delay is presumably caused by ambidexterity; poor muscle tone and unspecified motor clumsiness, neurological trauma, association with autism, Asperger syndrome/Tourette syndrome/ADHD, defect in the understanding of space where writing skills significantly get below chronological age ranging from poorly formed to general illegibility, reluctance or refusal to complete writing tasks, odd writing grip, pain while writing, poor spelling caused by difficulty with letters p, q. b. d. The learners with dysgraphia can be helped through the following accommodations, modifications, and techniques of being patient and positive when practicing handwriting, encourage proper grip, posture, and paper positioning, allow the use of a word processor, teachers administer the oral exams and allow the learners to dictate assignments to

a scribe, avoid criticisms for sloppiness or illegibility, provide additional time for writing tasks and use writing paper with raised lines [14]. The dysgraphia interventions for mitigating the writing difficulties can be divided into medical and pharmaceutical intervention, and social- educational psychology intervention that includes exercises which create the necessary skills that direct behavior by speech therapy, self-monitoring where the children are asked to pause after each word to see if they have griped the pen correctly and to relax for some minutes [15]. The intervention for the dysgraphic learners consisted of 18 sessions of two hours each that focused on learning activities for handwriting, spelling, and composing with oral instructions through earphones and written instructions on language displays on screen. Even though dysgraphia may occur in isolation, it is believed to be commonly associated with dyslexia and other learning disorders, of which 30% to 47% of children with writing problems, attention deficit hyperactivity disorder, cerebral palsy, and autism spectrum disorder, with studies showing 98% of these children with these learning disorders struggle with writing [16].

Dyscalculia

Dyscalculia is a condition where the learners exhibit inability to acquire arithmetical skills, difficulty understanding simple mathematics concepts, lack an intuitive grasp of numbers, and have problems learning number facts and procedures. The prevalence study conducted among regular primary school children in Flanders in 2001 and stated 3 to 8% of the children were found to have mathematical learning disabilities [17]. Mathematics difficulties are common in both children and adults with estimate that up to 25% of economically active individuals in countries like United Kingdom lack basic numerical knowledge, skills and understanding that is essential for them to act confidently and independently in everyday life, educational settings, and work [18]. The study suggests that about 5-6% of children of average to superior intelligence have specific learning deficit for mathematic which is similar prevalence to dyslexia which cemented the assumption that dyscalculia originated from dyslexia, where 40% of children who exhibit reading difficulties also have deficit in learning mathematic [19].

ADHD

The harsh situation in refugee camps magnified the learning disabilities into further childhood neurological damage observed to be attention deficit hyperactivity disorder (ADHD), auditory processing disorder (APD), visual perceptual/visual motor deficit (VPD), Language processing disorder, and Nonverbal learning disability. Those extraordinary disorders increased the harsh situation where the sufferers are subjected to adverse psychosocial problems. Attention Deficit and Hyperactivity Disorder is a neurodevelopmental disorder that impacts parts of brain which control attention, organizing thoughts, executive function, and concentration where children exhibit trouble paying attention, controlling impulsive behaviors, organize thoughts and follow instruction, inattentive, forget or lose things, squirm, or fidget, talk too much and inappropriate [20]. This neurodevelopmental disorder affects 11% of school-age children, and the symptoms continue into adulthood in more than three-quarters of children ADHD is characterized by inappropriate levels of inattention, impulsivity, and hyperactivity, which adverse consequences, including school failure, family stress and disruption, depression, problems with relationships, substance abuse, delinquency, accidental injuries, and job failure. ADHD also contributes to variety of health problems, which consists of substance abuse, anxiety, chronic stress and tension, and low self-esteem, neglecting important responsibilities such as check-ups, skipping doctor appointments, ignoring medical instructions, and forgetting to take vital medications,

experience financial and career difficulties, and intense sense of underachievement. In as much the medication is indispensable for treating attention deficit hyperactivity disorder, ADHD can be a major source of anxiety for individuals, who requires habitual lifestyle changes to reduce your stressors to live successful life. The effects of attention deficit hyperactivity disorder can lead to stigma, reduced self-esteem, reduced future educational attainment and career opportunities. Moreover, misdiagnosis can also lead to similar conditions such as anxiety, conduct disorders, speech or language delay, medical disorders and other developmental disorders that may warrant a different course of treatment [21].

Auditory Processing Disorder

The auditory processing disorder (APD) is a deficit in the processing of information which are specific to the auditory modality and may exacerbate in unfavorable acoustic environments, particularly with difficulties in listening, speech understanding, language development, reading disability, learning disability, autistic spectrum disorders, and reduced intellectual functioning [22]. Auditory damage increases the prevalence of poor handwriting and poor reading condition characterized with inability to processing sounds and may misinterpret the information received and the sound or a hearing loss that interfere with communication, learning, language acquisition, reading skills, social life, and academic achievements [22].

The learner could exhibit difficulty to understand the lesson in noisy places where more than one person is talking, fast speech, learning songs, nursery rhymes, and identifying where sound is coming, and easily distracted by sound; difficulty to remember what is said, read, spell, and learn due to its etiology chronic ear infections, head trauma, medical conditions that occur before or after birth such as prematurity, low birthweight, cytomegalovirus, lead poisoning, heredity, and immature nervous system. Auditory Processing Disorder are used interchangeably with Central Auditory Processing Disorder which consists of difficulty to understand speech in the presence of background noise, difficulty understanding rapid, muffled, distorted speech, frequent requests for repetition, difficulty following verbal directions, misinterpreting sarcasm, exhibiting academic difficulties, reading, spelling, and learning problems, difficulty sustaining attention, with suggested etiology to be genetic related, head trauma, neurological disorder, disease, chronic ear infections, prenatal, neonatal factors, neuromaturation [24].

Visual Perceptual/Visual Motor Deficit

The children with visual problems appear to be off track and considered to be with disorderly behavior, visual perceptual deficit where a child cannot accurately, discriminate, interpret, and organize visual information, which is the ability to store and retrieve a visual image. The visual perceptual deficits represent a selective loss of previously acquired visual cognitive abilities due to a circumscribed lesion, which comprised of difficulties of identification disorders due to disturbed object representations [25]. Higher prevalence of visual motor skill dysfunction was among the learners with disabilities compared learners without learning disabilities from a clinic population. The 78% of the 261 learners with learning disabilities had reduced visual motor skill compared with only 25% of non-disabled. Additional investigation was conducted to establish the relation between academic achievement and visual-motor integration skill using the Beery Developmental Test of Visual-Motor Integration in a group of 191 children in Early Childhood Development and found that visual-motor integration skill was significantly related to scores on standardized tests administered by the school and to the teachers' ratings in reading, math, writing, and spelling. While the clinicians used the anecdotal observation and testing limit to comprehend the components of the visual-motor integration, the

developmental neurological approach incorporate the visual motor ability into the assessment to correlate the skills toward examining observable, cognitive, behavioral, and perceptual problems [26].

The Magnified Associated Psychosocial Problems

The deepening inability, loneliness, and vulnerability of the children with learning disabilities get the associated psychosocial problems magnified. The children with learning disabilities suffer other comorbid conditions in addition, such as dyslexia with post-traumatic stress disorder, sexual abuse, physical abuse, neglect, depression, substance abuse [27]; and experience rejection, and neglect from peer group, and being ignored by their classmates, and consequently experience isolation and loneliness and get exposed to greater risk of aggressive and disruptive behavior, shy, anxious, and social withdrawal. The comparative study between children with and without learning disabilities found the learners with learning disabilities to suffer from depression, anxiety, loneliness, and experience negative emotions that stems from poor academic achievement because of stigmatization and isolation. Childhood learning disabilities such as writing, reading and arithmetic challenges influence psychiatric effects on adolescents which subsequently result to social problems, anxiety, depression, school dropout and future unemployment [28]. The commonest clinical syndromes of post-traumatic stress disorders exhibited in persons with learning disabilities include major depression, complicated grief reaction, schizophrenia, autism, bipolar disorder, dissociative disorders, multiple personality disorder, Tourette's syndrome, Asperger syndrome, substance abuse, panic disorder and pedophilia. People with the learning disabilities are at higher risk of contracting chronic conditions such as heart failure, epilepsy, severe mental illness, stroke and transient ischemic attack, diabetes, and dementia than the wider population [29].

Neglect

Child neglect remains the major cause of child maltreatment with consequences of physical abuse, sexual abuse, and witnessing domestic violence with multitude of risk factors known to impair normal development, chronic poverty, serious caregiving deficits, parental psychopathology, substance abuse, homelessness, family breakup, and poor prenatal and postnatal care [30]. The children with learning disabilities obtained low social preference and higher Liked Least scores than children without learning disabilities, and they were less popular and socially neglected and rejected. Abused and neglected children are likely to suffer from trauma and many problematic outcomes which include poor nutrition, poverty, poverty, delinquency, alcohol, or drug problems [31].

Sexual Abuse

Child sexual abuse also include intercourse, attempted intercourse, oral-genital contact, fondling of genitals directly or through clothing, exhibitionism or exposing children to adult sexual activity or pornography, and the use of the child for prostitution or pornography .The studies indicate that child sexual abuse have short and long term psychological, emotional, social, and physiological consequences, with many individuals who experienced sexual abuse having multiples mental health disorders including attempted or completed sexual penetration as compared to those who were not exposed [32].

Rejection

The study shows that child maltreatment has long-term adverse effects on self-control, peer relations, delinquency, peer rejection, physical abuse, higher rate of violence and other crime. Stereotypes, prejudice, and stigma contribute to the discrimination and exclusion experienced by people with disabilities and their families in all

aspects of their lives. This lack of understanding and misconceptions about the cause of disabilities often result from cultural or religious beliefs that often blame disability on misdeeds of ancestors; parents; or this wrongdoing of person with disabilities; supernatural forces such as demons; witchcraft; or God punishment [33]. While progress have been made to improve the child-parent relation, cases of severe rejection of a parent continue to challenge legal and mental health professionals who struggle with how to manage and improve the strained parent–child and familial relationships; with many families exhibiting high conflict dynamics, anger, hostility, distrust, discordant co-parenting, personality disorders in the parents, and involvement in protracted litigation [34].

Traditional Learning Activities

The childhood neurological damage declined where the children received rehabilitative educational services. The 2007 report indicated that there were 2.7 million students in America's public schools which had learning disabilities. These students represented 44% of 6 million school-age children with all kinds of disabilities who received special education services [35]. This triggered the need for rehabilitative educational services to excavate the prevailing phenomenon and addressed it or mitigate increasing childhood neurological damage and impact in the refugee camps of South Sudan.

The Visual Learners

The teaching technique for the children with dyslexic conditions require multi-sensory approach which involves seeing, listening, speaking, touching with much variation as possible, and categorize the teaching techniques into visual, auditory, and kinesthetic learners. The visual learners can be assisted to learn in form of pictorial and multi-media materials; sticking to spelling words anywhere to be viewed; looking at the pictures in a book before reading; playing games to improve memory; using a good visual software program and having an uncluttered work area.

The Auditory Learners

Similarly, the auditory learners can be helped to read a book or the information to be learned; ensuring that instructions are orally clear; getting the student to record the information to listen to it again and using software which has good auditory input. Remedial treatment is use in drill and practice where the teacher provides a clear example of good handwriting, and the children follow the instruction to practice the drill using the teacher's model. Hence repetitive practice, along with correct position and pencil grip can help with this process and build fine motor skills, and help improve hand functioning, which can lead to better handwriting [36].

Mental Health and Social Support through Behavioral Activities

Psychosocial interventions are instrumentally crucial for mitigating learning disabilities and identified behavioral interventions which involved personal, social, and environmental events which precipitate behavioral impact.

Behavioral Skills through Games

Significant number of educators acknowledge that traditional learning activities failed to match the learners' needs, preferences, and expectations; hence the educational, therapeutic, and social impact of serious games supported with gaming technology facilitated through the process of experiment, which foster the development of the learners cognitive, spatial, motor skills and teach them how to solve complex problems, foster creativity, genuine collaboration and range of emotions such as joy, empathy, anger, frustration, and memorization which enhanced motivation, engagement, and progress in a variety of skills and abilities [37].

Skinner B.F theory of operant conditioning is a crucial and instrumental tool for psychosocial intervention to improving not just a psychological dimension such as thinking, attitudes, and motivation, but also social learning

such as teaching and reinforcing new behavioral skill including social discussion aimed at improving mental wellbeing [38].

Behavioral Skills through Work-Skits

Bandura identified three areas for learning which consists of observation, imitation, and modelling, and termed observational learning in his experiment as effective attention, retention, reciprocation, and motivation. He stressed that children learn through behavioral imitation, observation, and modeling of other people, and elucidated that development of cognitive competencies can be accelerated by symbolically modeling the reasoning strategies for domains, highly informative way, of which a great deal of human thought is linguistically based. Hence, children acquire knowledge about objects and the relationships between them through nonlinguistic processing of direct and vicarious experience. Such understanding helps to impart meaning to linguistic symbols and by relating the utterances, they hear what they understand to be going on at the time [39].

Behavioral Responsibility Skills

Bandura emphasized on changing overt behavior involving environmental change and social interaction using approaches that enhance self-control and a focus on client responsibility and the therapeutic relationship, and intervention approaches used in behavioral therapy are coping and social skills training, contingency management, modelling, anxiety reduction and relaxation methods, self-management methods and behavioral rehearsal. In addressing the education issues, it focuses on two traditional cognitive behavioral learning and change such as cognitive restructuring and social skills training, social and community responsibility therapy and social-community responsibility skills training [39].

Methodology

The study employed qualitative, quantitative, and anthropological methods to rigorously explore the link between the learning disabilities and associated psychosocial problems in South Sudan refugee camps. The writer used Mugenda Mugenda (2003) method which approves ten percent as the sample size. The study used purposive sampling technique to select 60(32 females, 28 males) out of the 600 children with disabilities, and 55 (20 females, 35 males) out of the 550 teachers recruited in camp schools, 5 (1 female, 4 males) education officers, 10 (5 females, 5 males) child protection officers, 8(2 females, 6 males), health Personnel (medical and mental health staff) and 10 (7 females, and 3 males) parents/guardians. The tool used consists of questionnaires, interviews, focus group discussions, and observation.

Discussion and Results

The study shows that the learners identified with learning disabilities manifested significant symptoms of psychosocial problems. The study revealed 32 children who appeared normal in the camp but have cognitive hindrances, with dyslexic and physical disabled learners suffering from variety of maladjustments in the camps. The results showed that out of the 47 respondents diagnosed with learning disabilities, 43% of the children exhibited psychosocial problems which consists of low self-esteem, emotional problems, depressive disorder, anxiety, posttraumatic stress disorders (PTSD), bully, discrimination, lack of confidence lack of emotional family attachment, parental neglect, physical abuse, low self-esteem, hopelessness, helplessness, avoidance, suicidal tendance, frustration, self-blame, anger, anxiety, depression, social withdrawn, emotional pain, loneliness, and social withdrawal; compared 80% of learning disabled learners who exhibited psychosocial problems in Greece [40].

The education actors administered co-curricular activities to address psychosocial problems among the learners from early childhood development, primary and secondary schools, which comprised of football, volleyball, skipping rope, swing, talent show, drama, dominoes, ludo, draw therapy, and sing of songs.

The extracurricular activities were aimed at addressing physical, emotional, mental, social, cultural, and academic problems. The approach made significant implicit progress in addressing psychosocial problems that made this multisensory approach indispensably effective in schools, child friendly spaces and community where children play variety of games after school hours, and weekends. The recreational activities subsequently improved the learners' self-esteem, confidence, social participation, reduced anxiety and depressive disorders and increased resilience. These were proven during social rehabilitation support activities, where out of 47 children with learning disabilities and psychosocial problems who participated in sport activities, 85% enhanced self-esteem, confidence in social interaction, lessened anxiety, and depressive symptoms, improved physical and psychosocial wellbeing, increase happiness, resilience, and relaxation. Out of the 20 learners who were engaged in playing dominoes and dice child friendly spaces, 85% of them improved self-confidence, social interaction, and some arithmetic calculation. Similarly, out of the 30 learners who played rope skipping, and talent shows 90% enhanced alphabetic reading, spelling, numerical count by reciting words, and numbers, and social interaction which increased joy, which were impactful on physical and mental wellbeing. The games tailored in learning enhance learners' pleasure, promotes desire, enthusiasm, and attention, addresses boredom, and increase learners' achievement leading to emotional, social, and cognitive development. This is in line with Skinner B. F operant conditioning theory which emphasized on social games that foster cognitive development and improve complex problems, foster creativity, genuine collaboration, and range of emotions such as joy, empathy, anger, frustration, and memory which enhanced motivation, engagement, and progress in a variety of skills and abilities [37]. The female caregivers had extraordinarily motherly concerns for the children than their male parents.

The multisensory approach made a significant improvement on children's physical, emotional, mental, academic, and social wellbeing. The other approaches used includes drama, drawing therapy, fastening words in songs to improve learning, memory, participation, self-esteem, confidence, self-expression, mental and physical health, and enhance academic performance. This happened in line with Bandura theory that emphasized on social interaction that enhance self-control focusing on client responsibility and the therapeutic relationship, and intervention approaches used in behavioral therapy, coping and social skills training, contingency management, modelling, anxiety reduction and relaxation methods, self-management methods and behavioral rehearsal [39].

Contribution to the New Knowledge

The traditional recreational activities were routine activities for cognitive development, and addressing psychosocial problems such as PTSD, depression, and anxiety disorder, but little was known about how the learning disabilities cause psychosocial problem in South Sudan. Moreover, the fact that the study on learning disabilities was the first of its kind in South Sudan made the study indispensably instrumental and impactful in bringing insight of the learning disabilities and psychosocial problems.

Conflict of Interest in the Research

Concerning the conflict of interest and disclosure, the researcher acknowledged the resources used in the study with references and maintained the integrity of the study in all aspects, and therefore declared no conflict of interest.

Conclusion

In conclusion, the learning disability is conditions learning deficit in processing a language, and manifested in difficulty to comprehend, speak, read, write, spell, or do basic mathematical calculations, including perceptual disabilities, and disorders that affects

people's ability to either interpret what they see and hear and how to link the information from different parts of the brain. The psychosocial problems stemming out of the learning disabilities consists of depression, anxiety, stigma, stereotype, discrimination, internalized oppression, feeling shame, negative attitude toward education, avoidance, aggression, post-traumatic stress disorder and mental retardation [39]. The anthropological observational checklist confirmed the hypothesized notion that learning disabilities cause the associated psychosocial problems. Behavior games and extracurricular activities play at schools, and child friendly spaces with main objective to improve learners' psychosocial wellbeing, but it equally enhances participation, boost physical and cognitive development. Recreational activities likewise enhance memory, talents, social interaction, discipline, boost reading and arithmetic calculation. Although the approach was limited due to lack of technical skill and guidance from the teachers to diversify the approach effectively; the approach succeeded in the enhancement of the self-esteem, confidence, social interaction, lessened anxiety, and depressive symptoms, improved physical and psychosocial wellbeing, increase happiness, joy, resilience, and relaxation.

Recommendations

In line with the study findings on the learning disabilities and associated psychosocial:

1. The Ministry of General Education and Instruction should develop the curriculum for examining learners with learning disabilities on writing, reading, arithmetic, and interpersonal behavior in the early development studies.
2. The Ministry of General Education should have a mandatory and subsidiary exam for learning disabilities and closely monitored by the specialists.
3. It is important for government and educational actors to administer mandatory multisensory teaching training to the teachers to improve the teaching approach to enhance academic performance among the learners with learning disabilities.
4. Teachers needs training on how to tailor teaching and learning activities with co-curricular activities to improve learning and psychosocial wellbeing of learners with learning disabilities.

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Evaluating Smartphone Ownership and Usage for Maternal and Child Health in a Ugandan Slum

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Abstract

This research explores smartphone ownership and usage among Ugandan slum-dwelling women, assessing their readiness for mobile health maternal and child health interventions. A mixed-methods approach was employed, including a survey of 200 women and in-depth interviews with 23 participants. Findings reveal significant smartphone usage and a positive disposition towards receiving health information digitally. Women valued the informative nature and convenience of health messages on their phones. Challenges identified include costs and technological literacy. The study underscores the potential of mHealth solutions in low-income settings, highlighting the necessity for accessible and user-friendly technology.

Keywords: *mHealth, Maternal Health, Smartphone Ownership, Slum Settings, Technology Acceptance, User Attitude, Uganda.*

Introduction

In Uganda, maternal and child health outcomes persistently face significant challenges, especially in slum settings where access to quality healthcare services is limited [1]. In light of valuable feedback emphasizing the transformative role of mobile phones, we recognize the potential of mobile phone interventions to enhance maternal and child health outcomes in low-income settings, including slums [2]. These interventions have the capacity to increase access to vital health information, thereby contributing to improved health outcomes. Understanding the acceptability and feasibility of mobile phone interventions is crucial for developing effective and sustainable strategies to improve maternal and child health outcomes in slum settings in Uganda [3]. However, the impact of digital literacy on the acceptance of such mHealth solutions, especially in developing countries, remains a critical factor to consider [4].

The use of participatory design in the development of mobile health interventions has been shown to increase their acceptability and effectiveness. Studies provide insights into how mHealth is being used to improve maternal health in developing countries [5]. A study conducted in Uganda found that involving the target population in the design process of a mobile health intervention for maternal and child health led to increased user satisfaction and engagement [6].

Moreover, training and capacity building for healthcare workers and community health workers has been shown to be effective in improving maternal and child health outcomes. Another study conducted in Uganda found out that training community health workers in maternal and child health led to improved knowledge and practices, and increased uptake of antenatal care and skilled delivery [7]. As well, behavior change communication strategies have been shown to be effective in improving

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maternal and child health outcomes. Furthermore, a study conducted in Uganda found out that a behavior changes communication intervention led to increased knowledge and practices related to maternal and child health [8]. Mobile health clinics have been shown to be an effective way to provide healthcare services to underserved populations. Moreso, another study conducted in Uganda found that mobile health clinics led to increased access to healthcare services and improved health outcomes for women and children [9]. Additionally, public-private partnerships have been shown to be effective in increasing the reach and sustainability of healthcare interventions. A study conducted in Uganda found that a public-private partnership led to increased access to healthcare services and improved health outcomes for women and children [10]. These studies demonstrate the effectiveness of various strategies in increasing the acceptability and effectiveness of mobile phone interventions in maternal and child health messages for slum dwelling women in Uganda. However, it is important to note that context-specific factors such as access to mobile phones and literacy levels can affect the implementation and effectiveness of these interventions. Therefore, it is crucial to tailor these interventions to the specific needs and circumstances of the target population.

The use of smartphones to promote messages about maternal and child health in slum settings in Uganda has been a topic of interest in recent years.

A randomized controlled trial conducted in a slum area of Kampala, Uganda, found that sending SMS reminders to pregnant women significantly increased their attendance at antenatal care clinics. The study involved 352 women and found that those who received SMS reminders were more likely to attend at least four antenatal care visits (79% vs. 64% in the control group). The study concluded that SMS reminders could be a cost-effective way to improve maternal health outcomes in slum settings [2].

A study conducted in a peri-urban area of Kampala, Uganda, found that delivering maternal and child health education messages via mobile phone was effective in increasing knowledge and changing behavior among women. The study involved 208 women and found that those who received the mobile phone messages had significantly higher knowledge scores and were more likely to breastfeed exclusively than those who did not receive the messages. The study concluded that mobile phone-based interventions could be an effective way to promote maternal and child health in resource-limited settings [2].

A study conducted in the slums of Kampala, Uganda, found that a mobile phone-based referral system was effective in improving access to emergency obstetric care. The study involved 125 health workers and found that those who used the referral system were more likely to refer women to emergency obstetric care and that women who were referred were more likely to receive appropriate care. The study concluded that mobile phone-based referral systems could be an effective way to improve maternal health outcomes in resource-limited settings [3].

The use of smartphones to promote messages about maternal and child health in slum settings in Uganda has shown promising results in improving antenatal care attendance, enhancing maternal and child health education, and improving access to emergency obstetric care [3]. There is therefore potential of mobile phone-based interventions to improve maternal health outcomes in resource-limited settings.

This study addresses a crucial gap in understanding smartphone penetration and user attitudes towards digital health interventions in Ugandan slums.

Despite the growing reliance on mobile technology for health initiatives globally, little is known about the extent to which women in these underprivileged areas have access to and are

willing to utilize smartphones for health-related purposes. This research is essential as the success of mobile health (mHealth) programs heavily depends on the target population's access to technology and their openness to adopt such interventions. By investigating both the extent of smartphone ownership and the attitudes towards using these devices for health purposes, this study aims to provide valuable insights into the feasibility of implementing mHealth solutions in these communities.The findings will not only fill a critical knowledge void but also guide the design and implementation of more effective digital health strategies in similar settings.

The general objective of this study was to evaluate the level of smartphone ownership and usage among women of reproductive age in Ugandan slum settings and to investigate their perceptions regarding the use of smartphone interventions for maternal health. This involved exploring the technological readiness and the attitudinal landscape towards digital health solutions in these communities, thereby providing insights critical for the design and implementation of effective mHealth programs in similar low-income settings.The specific Objectives of the study were to: i) Determine the level of smartphone ownership and usage among women of reproductive age in the slum setting and ii) To investigate the perceived benefits and barriers to using a smartphone intervention for maternal and child health access among women in the slum setting.

The novelty of this study lay in the specific context of the slum setting and the use of smartphone intervention. While previous studies have investigated the acceptability of various interventions for maternal and child health in other settings, this study is the first to focus specifically on the slum setting and the use of smartphones in Uganda.

Research Methodology

Selection of Study Area

The study was conducted in five slums of Kawala, Kiswa, Kisenyi, Kanyanya and Namuwongo among others in Uganda, where access to maternal and child health services is often limited. These were selected based on their high population density, poor living conditions, and lack of basic amenities such as clean water and sanitation facilities. The study participants were women of reproductive age who reside in these slums.

Sample Size Determination

The target population consisted of women of childbearing age (15 – 49 years) residing in the slum settlements in five slums in Kampala, the capital of Uganda. Nurses and midwives in health centres in the slum settlements responsible for monitoring and reporting on the frequency of visits by the women were also included. The study population included pregnant women in any stage of pregnancy, mothers within the postpartum period (6 – 8 weeks after delivery), and mothers with infants aged 2 months to 1 year residing in slum settlements in Kampala city. These categories were chosen as they represent high-risk groups for pregnancy-related morbidity and mortality and allow for the evaluation of the intervention's impact on vulnerable populations. Our approach was informed by reviews of technological interventions for maternal healthcare in various settings, including rural regions [11]. The study involved 200 participants out of which 23 women participated in the interview sessions and the others filled in questionnaires. convenience sampling was used whereby the participants were enrolled as they attended the health facilities, were used. Purposive sampling was used to identify nurses and midwives from health facilities in the slums based on their availability and willingness to participate. It is noteworthy that the study was conducted across five health centers, comprising 2 Health Centers (HC) III and 3 Health Centers (HC) IV, to ensure comprehensive data collection and representation.

Data Collection

The study used a mixed-methods approach to collect data. To ensure data control, reliability, and validity, rigorous tests of the data instruments were conducted on the survey questionnaire and the interview guide. These measures enabled the researcher to collect the required data effectively and maintain the quality of the study.

Qualitative data were collected through in-depth interviews with the study participants. The interview guide was meticulously designed to explore the acceptability of a smartphone intervention for improving maternal and child health access. The guide also delved into the perceived benefits and barriers to the use of smartphones for health purposes. Importantly, the interview guide underwent rigorous reliability and validity checks to ensure that it effectively captured the intended information accurately.

Quantitative data were gathered through a survey questionnaire administered to the study participants. The questionnaire assessed critical factors, including the level of smartphone ownership and patterns of smartphone usage among the participants. Similar to the interview guide, the survey questionnaire was subjected to rigorous reliability and validity assessments to maintain the data's integrity.

Statistical Analysis

The qualitative data were analyzed thematically using a deductive approach. The data were transcribed, coded, and organized into categories based on the research objectives and themes that emerged from the data using NVIVO 12. The data were then synthesized to identify patterns and trends related to the acceptability of the smartphone intervention for improving maternal and child health access in a slum setting in Uganda.

Additionally, it's important to note that the collected data from the focus discussion groups were originally conducted in Luganda, which is a local language widely spoken in the slum settlements. To ensure a comprehensive analysis and understanding, these interactions were later translated into English. This translation allowed the participants to express themselves effectively. Recordings of the interactions were made and later listened to in order to generate key issues and themes raised.

The quantitative data were analyzed using descriptive statistics to determine the level of smartphone ownership and usage among the study participants using Statistical Package for Social Sciences (SPSS) version 26. Descriptive and inferential statistics, such as chi-square tests, were also employed to explore the associations between smartphone ownership and usage and other variables such as age, education level, and income.

Triangulation of the quantitative and qualitative findings was conducted in line with the assertion in [12], as it allows for a deeper examination of certain aspects for comparison and provides more information that might not have been clear by one method of data analysis.

Ethical considerations for the study were rigorously upheld, with meticulous attention to ethical conduct. Approval was obtained from the Clarke International University Research Ethics Committee (REC), and permission to conduct the study was granted by both the Uganda National Council for Science and Technology (UNCST) and the Kampala Capital City Authority (KCCA). Additionally, informed consent was independently secured from each participant, ensuring they were fully aware of the study's aims, their rights, confidentiality measures, and their right to withdraw. These measures ensured that the research adhered to the highest ethical standards, respecting participant autonomy and maintaining the integrity of the research process.

The study acknowledged potential biases and limitations in its methodology, including the representativeness of the sample and constraints in data collection methods. These acknowledgments were essential to provide a

balanced view of the study's findings and their applicability.

Results and Discussion

Demographic Data for the Study Participants

Figure 1 below shows the age distribution of study participants, providing insights into the age profile of the women involved in the study.

Survey Results: Participant Characteristics

From table 1 above, it is indicated that majority of the respondents fall within the age bracket of 20-24 years constituting 42% implying that they are young mothers that need assistance during this period of pregnancy and the early stages of child birth to reduce on complications. In terms of the education levels, the majority of the respondents 74% had attained secondary education which indicated that they are able to read these health messages on their phones but also were able to understand the questions in the survey questionnaire as well as the interview guide and the focus discussion checklist to give valid responses for this study. The major form of occupation among respondents was home make which constituted 51.5%; 44.5% of the respondents were in a relationship implying that they are bound to get pregnant therefore the smartphone intervention would be a valuable mechanism to access healthcare services and information. Also, these results suggest a community with limited higher education and formal employment opportunities. This context is important for understanding the health needs and access to healthcare information of the population. 38% of the respondents had stayed in these slums for less than 1 year indicating that the number of people increase which is bound to increase the pregnancy levels and child birth. 24.5% of the respondents had only one child and 52.5% of the respondents had produced their 1st child in health centres, while 30% of the respondents had produced child number 2 in health centres, 11% in health centres for child number 3 and 6% had produced child number 4 in health centres. In regard to ownership of smartphones, 99.5% of the respondents owned smartphones, 90.5% of the respondents were pregnant hence the app being so essential for information accessibility while 82.1% of the respondents were comfortable using smartphones implying that more efforts to train these women who own smartphones on how to use them is important.

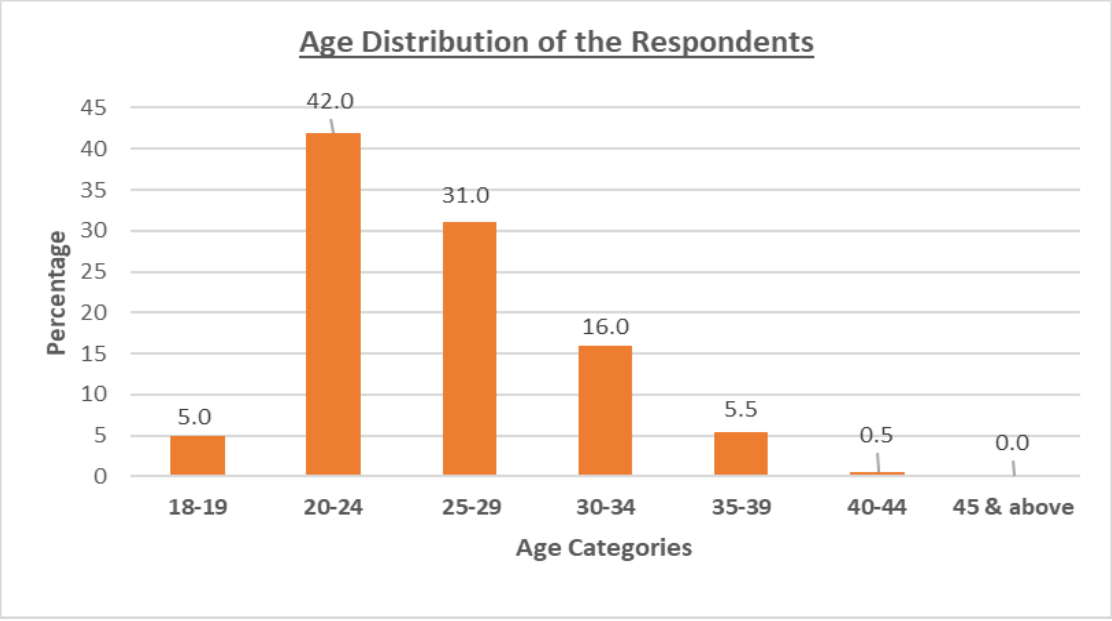

Figure 1. Age Distribution of Study Participants

Table 1 below presents demographic data of the study participants, detailing various aspects like education level, occupation, and marital status.

Figure 2 below shows the number of children that the study participants indicated to have had.

Table 1. Demographic Data for the Study Participants

SN.	Covariate Category	Covariate Detail	Percentage (%)	Frequency
1	**Highest Level of Education**	No formal	0.5	1
		Primary Education	11.5	23
		Secondary Education	74.0	148
		Vocational/Trade school	0.0	0
		Bachelor's Degree	5.0	10
		Master's degree	0.0	0
		Doctorate	0.0	0
		Others	9.0	18
		Total	**100.0**	**200**
2	**Primary Occupation**	Home Maker/ Domestic unpaid worker	51.5	103
		Self-employed (small scale business)	25.0	50
		Employed in the formal sector (Govt/private)	10.0	20
		Employed in informal sector (Causal/daily wage labor)	7.0	14
		Student	2.5	5
		Unemployed	2.0	4
		Others	2.0	4
		Total	**100.0**	**200**
3	Marital Status	Single	0.0	0
		Married	25.5	51
		Widowed	0.0	0
		Divorced	0.5	1
		Separated	3.0	6
		In a relationship	44.5	89
		Cohabiting	26.5	53
		Total	**100.0**	**200**
4	**Period Spent at Place of Residence**	Less than 1 year	38.0	76
		1-2 years	24.0	48
		3-5 years	15.5	31
		6-10 years	11.0	22
		More than 10 years	11.5	23
		Total	**100.0**	**200**
5	**Status of Pregnancy**	Yes	90.5	181
		No	9.5	19
		Total	**100.0**	**200**
6	**Ownership of Mobile Phones**	Yes	99.5	199
		No	0.5	1
		Total	**100.0**	**200**

Source: Primary data, 2023

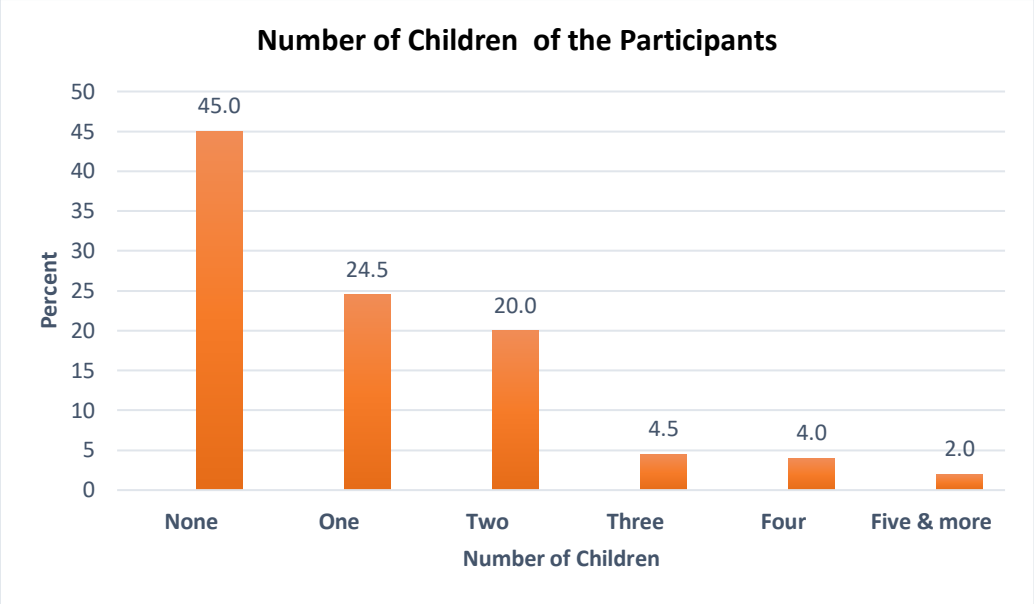

Figure 2. Number of Children of the Participants

Table 2 details the place of delivery of previous children of the participants, offering insights into childbirth practices among the study group.

Table 3 provides an overview of the study participants' comfort levels with using mobile applications.

Table 2. Place of Delivery of the Previous Child

Covariate		**Percentage (%)**	**Frequency**
Child One	H/Facility	52.5	105
	Home	2.5	5
	Others	0.0	0
	NA	45.0	90
	Total	**100.0**	**200**
Child Two	H/Facility	30.0	60
	Home	0.5	1
	Others	0.0	0
	NA	69.5	139
	Total	**100.0**	**200**
Child Three	H/Facility	11.0	22
	Home	0.0	0
	Others	0.0	0
	NA	89.0	178
	Total	**100.0**	**200**
Child Four	H/Facility	6.0	12
	Home	0.0	0
	Others	0.0	0
	NA	94.0	188
	Total	**100.0**	**200**

Table 3. Comfortability Level with using Mobile Apps

Covariate	Percentage (%)	Frequency
Very comfortable	18.5	37
Comfortable	63.5	127
Neutral	11.0	22
Uncomfortable	6.5	13
Very Uncomfortable	0.5	1
Total	**100.0**	**200**

Quantitative Results from Survey:

Percentage of Smartphone Owners and Use their Phones to Access Health Information

This bar chart, titled "Smartphone Use," visually represents a study on smartphone ownership and its use for accessing health information among participants. The vertical axis shows percentages, while the horizontal axis has three categories: "No" (participants who don't use their smartphone for health information), "Yes" (those who do), and "Total" (overall smartphone ownership).

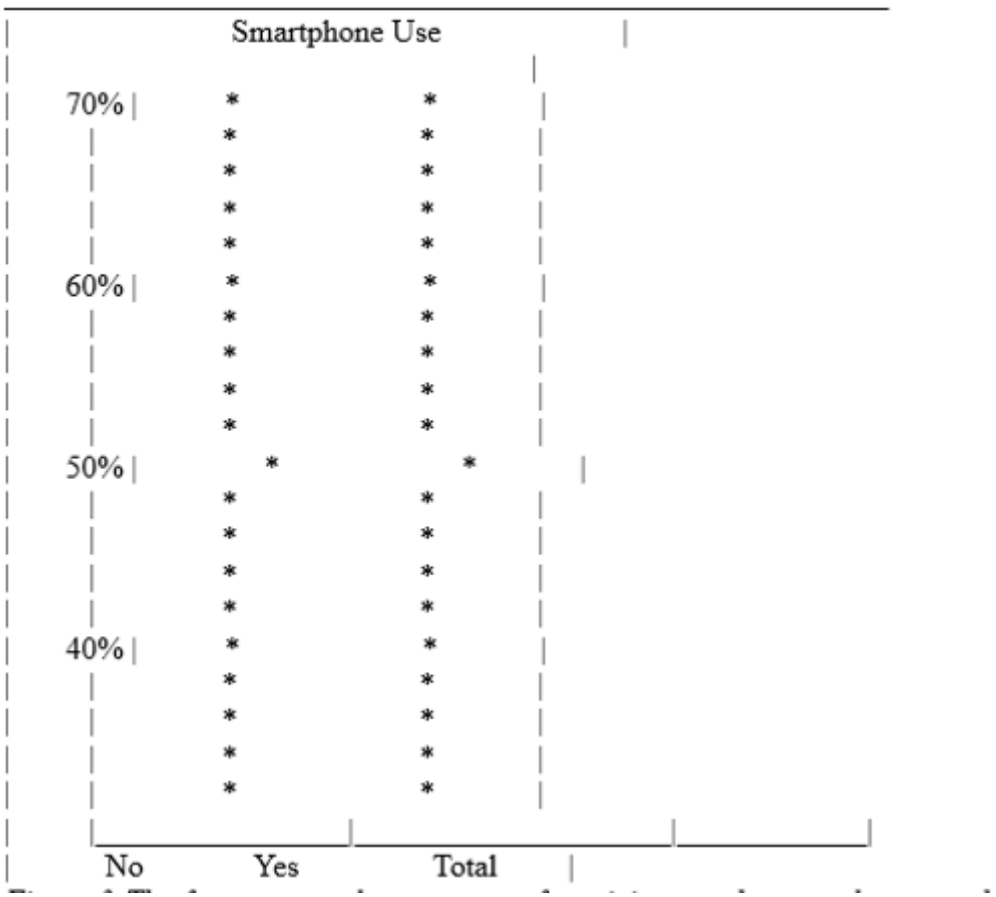

Figure 3. The Frequency and Percentage of Participants who owned a Smartphone and used it for Accessing Health Information

Figure 3 shows the percentage of participants who owned a smartphone and used it for accessing health information. The "No" and "Yes" bars represent the percentage of participants who did not use their smartphone for health information and those who did,

respectively. The "Total" bar shows the total percentage of participants who owned a smartphone. 70% of participants owned a smartphone, and 50% of all participants used it for accessing health information. This ownership also contributes to their digital empowerment in slum conditions, an aspect crucially explored in recent studies [13].

Percentage of Women in the Study Reported Facing Barriers to Accessing Maternal and Child Health Services

Table 4 below shows the Percentage of Women Facing Barriers to Accessing Maternal and Child Health Services. 5 women (2.5% of the respondents) report finding it somewhat difficult to access these services, 76 women (38%) find it somewhat easy, and 119 women (59.5%) report finding it very easy to access these services.

The data from the table 4 indicates that a small fraction (2.5%) of the women in the study report difficulties in accessing maternal and child health services, while a significant majority (97.5%) find it relatively easy to access these services. This suggests a promising potential for leveraging smartphone technology as a tool to bridge healthcare access gaps. If supplemented with targeted capacity-building initiatives, such as training in the use of health-related mobile applications or information services, the widespread ease of access to these services could be further enhanced. This approach could be particularly effective in empowering those who currently face barriers, thereby contributing to improved health outcomes in the community.

Table 4. Women Facing Barriers in Accessing Maternal and Child Health Services

	Respondent(n=200)
Somewhat difficult to access	5 (2.5%)
Somewhat easy to access	76(38%)
Very easy to access	119(59.5%)

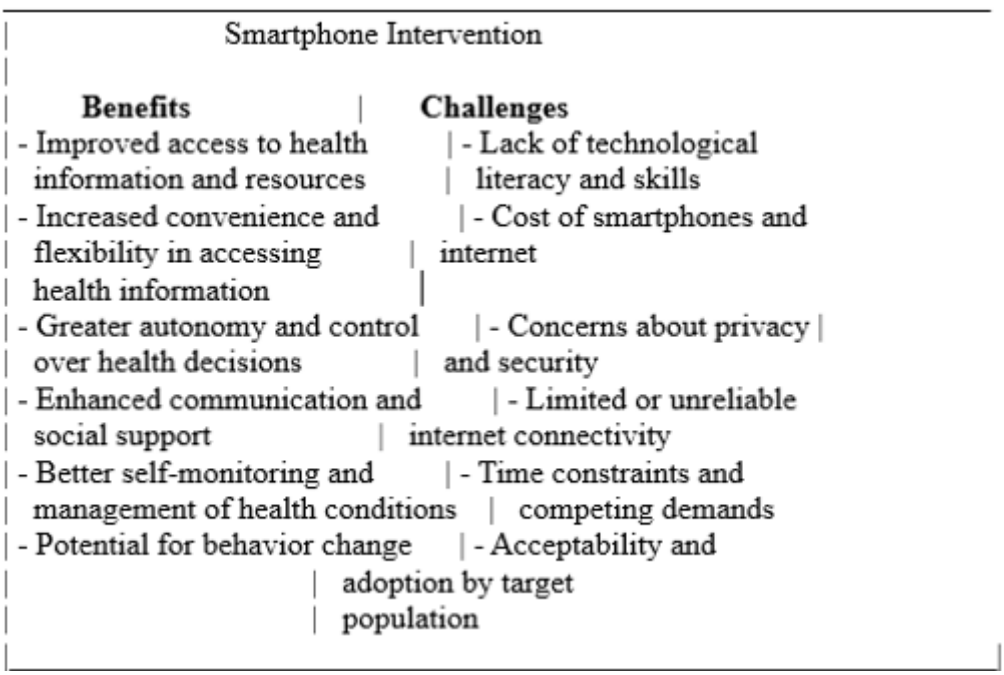

Figure 4. Themes and Subthemes that emerged from the focus group discussions on the Benefits and Challenges of the smartphone Interventions

Benefits and Challenges of the Smartphone Intervention

The thematic map in Figure 4 shows the two main themes that emerged from the focus group discussions: "Benefits" and "Challenges." The Benefits theme is shown on the left-hand side of the map, with subthemes that highlight the various advantages that the participants saw in using a smartphone for accessing health information. The Challenges theme is shown on the right-hand side of the map, with subthemes that illustrate the difficulties and obstacles that participants perceived in using a smartphone for health-related purposes.

One of the participants commented and said;

'With the introduction of this intervention for us the pregnant mothers, we shall be able to have quality time with the nurses and explain our health problems without a rush because of long lines at the health facilities.'

Another participant denoted that;

'Whereas this is a good solution to our health problems and issues during pregnancy and after child birth, its important that privacy and confidentiality when receiving the messages to be taken into consideration.'

Women suggested that the messages be tailored to their individual needs and preferences not general messages to allow the raised issues to be solved.

Despite the benefits electronic health messages bring to the women, the participants specifically raised these concerns with this intervention;

'I am a single mother with a 6 months baby struggling to find what to eat, how can I invest in buying a smart phone? I can use my small phone of UGX. 50,000 to call and receive call, accessing a smartphone for me is really difficult given my condition.'

'I stopped in primary 7 and I studied in a government school implying my English is limited, accessing this information maybe ease but understanding it seems difficult because most of the messages I receive on my phone are in English which I don't bother reading. How will I understand these messages unless they will be sent in my local language which is Luganda.'

In summary, the study demonstrates that implementing a smartphone intervention for maternal and child health is both feasible and well-received by women in Ugandan slum settings. Mobile phone penetration is high, and there is a strong interest in receiving health messages via smartphones. Healthcare providers also support the intervention, making it a viable solution to improve healthcare access in these areas.

Discussion and Conclusion

The study underscores the persistent challenge of maternal and child health in low-income countries, particularly in slum settings where healthcare access is constrained. To address this challenge, innovative solutions harnessing modern technologies like smartphones are essential. This study specifically explored the acceptability of a smartphone intervention to enhance maternal and child health access among slum-dwelling women in Uganda, specifically in Kamwokya. The findings provide valuable insights into the potential of such interventions to improve health outcomes.

Overall, the study reveals that employing a smartphone intervention to enhance maternal and child health access is highly acceptable and feasible among slum-dwelling women in Uganda. These results align with previous research highlighting the potential of mHealth interventions to improve maternal and child health outcomes in resource-constrained settings [2].

Moreover, the study unveils specific features and content highly valued by slum-dwelling women in the context of maternal and child health. Personalized health messages tailored to their pregnancy stage or child's age were deemed crucial, consistent with prior studies emphasizing the importance of customizing mHealth interventions to meet the needs and preferences of target populations [2].

An additional significant finding emphasizes the role of social support networks in promoting the adoption and sustained use of the smartphone intervention. Women in the study frequently shared health information with peers, reinforcing their own engagement and learning. This aligns with existing research highlighting the impact of social support and peer networks on health behavior change [14;15].

The role of mHealth in bridging educational gaps in women's health in lower-income regions cannot be overlooked [16]. The use of mobile technology in community health monitoring presents both promises and challenges, as highlighted in recent literature [17].

It is essential to acknowledge the study's limitations. Firstly, it was conducted in a single slum setting in Uganda, which may limit its generalizability to other contexts or populations. Secondly, the relatively small sample size might have restricted the detection of nuanced differences in the acceptability and feasibility of the smartphone intervention among different subgroups of women. Lastly, the study did not capture data on actual health outcomes, preventing a comprehensive assessment of the intervention's impact on maternal and child health outcomes.

Our findings align with research on smartphone-based health promotion, effective in tackling maternal mortality in under-resourced settings [18]. The role of mobile phones in health education is particularly significant in women's health in developing nations [19].

The study evaluated the effectiveness of a smartphone intervention in enhancing maternal and child health access for women in Ugandan slums. Findings strongly affirmed the feasibility and acceptability of this smartphone intervention. Women in slum communities showed high mobile phone ownership and keen interest in receiving health messages via smartphones. Support from healthcare providers significantly bolsters the potential success of the intervention.

Given the positive response to smartphone interventions, it is recommended to develop tailored programs that specifically address the maternal and child health needs of women in Ugandan slum settings. These programs should align with the preferences and requirements of the target population. To maximize the impact of the smartphone intervention, it is essential to engage the community and leverage social support networks. Collaborative efforts with local leaders and influencers can enhance community participation and reinforce behavior change. Addressing privacy concerns is paramount. Future interventions should incorporate robust privacy and data security measures to ensure the confidentiality of user information and build trust among participants. To further advance the understanding of the intervention's effectiveness, future studies should include rigorous impact evaluations that measure the actual health outcomes of women and children who engage with the smartphone intervention. This will provide valuable insights into the intervention's contribution to improving maternal and child health in slum settings.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper. This research was conducted independently and did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The authors have no financial relationships that could be broadly relevant to the work.

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