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RESEARCH ARTICLE **OPEN ACCESS**

Assessment of the Knowledge of Healthcare Professionals on Nutrition and Diabetes Self-management in Type-2 Diabetes Treatment at a Health Facility in Tshwane, South Africa

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Abstract:

Background: Diabetes mellitus remains an important non-communicable disease globally and is rapidly emerging as a major public health problem. The burden of the disease continues to rise, even in sub-Saharan Africa. Healthcare professionals often lack the necessary skills to lead patients through lifestyle modifications and instead depend on pharmacological therapy. Recent studies advocate for the integration of innovative healthcare approaches and the promotion of non-pharmacological treatment in the context of broader education on lifestyle modifications for the management of diabetes and other conditions.

Aim and Objectives: This study aimed to assess the level of knowledge of nurses on nutrition and diabetes self-management in treating patients with type 2 diabetes mellitus at a community health centre in the Tshwane district.

Methods: A cross-sectional study was conducted amongst 53 nurses. A standardized questionnaire was modified to collect data from the nurses working at the health facility.

Results: Most healthcare professionals with lower knowledge scores were not aware of the DM guideline, with a p-value < 0.05. The healthcare professionals with a high knowledge score were not aware of the DM guideline as well. Overall, healthcare professionals working at the CHC had lower knowledge scores on nutrition and self-management of diabetes.

Conclusion: Healthcare professionals showed a notable gap in knowledge pertaining to nutrition and the self-management of diabetes. Promoting the adoption of current diabetes management guidelines and encouraging continued professional development can effectively address knowledge disparities, particularly among professionals with limited experience and diploma-level credentials.

Keywords: Self-management, Nutrition, Diabetes mellitus, Knowledge, Nurses, Healthcare.

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1. BACKGROUND/INTRODUCTION

Persistent high blood sugar levels and disruptions in the metabolism of carbohydrates, fats, and proteins characterize diabetes mellitus (DM), a complex metabolic disorder [1]. Its complications result from insufficiencies in insulin secretion, insulin action, or both [1, 2]. It raises significant global socioeconomic and public health issues [3, 4]. According to global estimates for 2021, 537 million adults between the ages of 20 and 79 were living with diabetes, representing almost 11% of the global

population [5, 6]. South Korea indicated a steady increase in the prevalence of type 2 diabetes mellitus (T2DM) over the past decades. During the COVID-19 pandemic, these trends accelerated, with increased weight gain and sedentary behaviour exacerbating diabetes risks. Key factors contributing to this rise include aging populations, dietary shifts, and decreased physical activity [7].

In the African region, where diabetes is more prevalent in rural communities, it was previously considered uncommon or undocumented [8]. However, in recent years, it has become recognized as a significant noncommunicable disease (NCD) in sub-Saharan Africa (SSA) [9]. According to estimates, DM affected 24 million people in 2021, and projections indicate this number will increase by 129 percent by the year 2045, reaching 55 million people [5]. It is estimated that 54% of people living with T2DM are undiagnosed [3]. Although the population of the region is predominately rural (61%), the majority of people living with diabetes (59%) reside in cities. However, rural areas experience more diabetes complications [10]. Urbanization and the aging population will further exacerbate complications of type 2 diabetes. Nearly half of all adults with diabetes reside in the four most populous countries of the African region—South Africa (2.3 million), the Democratic Republic of the Congo (1.8 million), Nigeria (1.6 million), and Ethiopia (1.3 million) [11]. Diabetes was responsible for 321,000 deaths in 2015 and 416,000 in 2021 in Africa, representing a 29% increase among people between the ages of 20 and 79 years [3, 5].

South Africa has the highest prevalence of people living with diabetes in Africa, with 4.2 million cases estimated in 2021 [5]. The country experiences an increased risk of obesity due to the consumption of foods that are rich in fat, sugar, and sodium [12, 13]. Economic growth, increased urbanization, improper diet, and physical inactivity are other risk factors associated with the development of diabetes in the country [3, 14].

1.1. Problem Statement

Studies indicate the significance of self-management for people living with diabetes. This includes regularly checking blood sugar, taking medications as prescribed, making healthy food choices, and staying active [15]. These lifestyle choices lower the probability of developing complications, such as neuropathy, cardiovascular disease, and retinopathy [16]. However, a study conducted in various countries suggests that healthcare professionals often lack the necessary skills to lead patients through lifestyle modifications and instead depend on pharmacological therapy [17]. In the United States and other high-income countries, medical training does not commonly prioritize nutrition education. This lack of emphasis is evident in diabetes care, where physicians frequently prioritize medication management over lifestyle interventions [18]. Recent studies advocate for the integration of innovative healthcare approaches and the promotion of non-pharmacological treatment in the context of broader education on lifestyle modifications for the management of diabetes and other conditions. The impact of alternative interventions beyond medication is demonstrated, indicating that healthcare professionals could apply these methods to diabetes self-management with appropriate training, thereby reinforcing the necessity of multidisciplinary care approaches [19, 20].

Diabetes mellitus poses considerable economic and health risks in South Africa [2]. The management of diabetes mellitus in South Africa is reported to be inadequate, with an estimated one in every four patients diagnosed with diabetes mellitus having effective control [16]. Nutrition, self-management, and emphasis on compliance in these patients play a critical role in the management of the disease [21]. Self-management practices are proven to yield positive outcomes in controlling diabetes, but patient adherence to these practices is limited. Successful self-management depends not only on patient effort but also on the healthcare provider's role in educating and guiding patients. The knowledge of healthcare providers is crucial in empowering patients to adopt practices and improve their health outcomes [9, 22]. Healthcare professionals in rural regions encounter additional constraints, such as inadequate funding and educational opportunities, which could increase knowledge gaps in diabetes management [23]. Additionally, in rural areas where access to specialized care is restricted, a shortage of education in nutrition and diabetes self-management among healthcare professionals could comparably impact patient outcomes, given the diverse healthcare system [24]. Considering the pivotal role that healthcare professionals play in the management of diabetes, it is essential to assess their knowledge on nutrition and self-management.

2. METHODOLOGY

2.1. Study Design

A cross-sectional study was conducted to describe the level of knowledge of healthcare professionals on nutrition and diabetes self-management in treating patients with type 2 DM.

2.2. Study Setting

The setting of this study was a Community Health Centre (CHC) situated in a township located in the Gauteng Province, approximately 30 kilometres from the City of Tshwane, which is the nation's administrative centre. It possesses an area of around 40 square miles. Its population stands at 120,800. Tsonga at 22 percent, Tswana at 20 percent, Zulu at 19 percent, and SePedi at 13 percent are major language groups in the area. However, all 11 official languages of South Africa are spoken in the region [25].

2.3. Study Population and Sample Size

The study population included all nurses working at the community health centre. There were 53 nurses who all consented to participate in this study. The undergraduate training of nurses in South Africa entails rotations in various units within primary health care settings where

they are exposed to chronic disease management, such as diabetes, hypertension, and HIV. Nurses can qualify through various educational paths, including certificate, diploma, or degree programs. Enrolled nurses complete a 2-year nursing course offered by nursing colleges accredited by the nursing council. This qualification is also referred to as a certificate in nursing. A nursing diploma requires approximately 3 years and 4 years for a Bachelor of Nursing degree. The study took place from September until December 2019.

2.4. Data Collection

Data were collected using a validated questionnaire related to the study by Talip *et al*. [26]. Healthcare professionals self-administered the questionnaire. We posed all questions in the same language, as English is the primary medium of communication and instruction in college for all professionals. The objectives of the study and consent were provided to the researcher prior to the study being conducted. The researcher disseminated the questionnaires to the HCPs and requested that they return them immediately to limit access to information gathering and inquiries from colleagues. The questionnaire was phased into three sections: (i) socio-demographic characteristics (age, sex, level of education, years of experience, and sources of information in the management of diabetes patients); (ii) nutrition knowledge; and (iii) self-management. Questions on the questionnaire were placed randomly, and the DM guideline was used to score them. Then, the data were prepared for analysis.

2.5. Data Analysis

The data obtained from the questionnaires were entered into a Microsoft Excel spreadsheet to be subjected to analysis with a statistical software utility, SPSS version 29.0. Socio-demographic characteristics of healthcare professionals were analyzed descriptively using frequencies and percentages in tables. Knowledge on nutrition and self-management of healthcare professionals was described, scored, and categorized on the levels of poor (0–17 scores), average (18–27 scores), and good (28–36 scores) knowledge. Healthcare professionals were considered to have good knowledge when their scores were 75% and above on nutrition and diabetes self-management. Knowledge scores on nutrition and diabetes self-management were compared with socio-demographic characteristics to determine associations. The researchers also considered a p-value of less than 0.05 to be statistically significant. A validated questionnaire was used, which was modified to suit the study's specific context. The healthcare professionals completed the questionnaires themselves, which minimized the potential influence of the researcher on their responses. The questionnaire was administered in English, the medium of communication and instruction at the university for all participants, to avoid language-related biases.

2.6. Ethical Consideration

The study received ethical approval from the Sefako Makgatho University Research Ethics Committee (SMUREC) prior to the study being conducted at the CHC, reference number SMUREC/M/93/2017:PG. In addition, the Chief Executive Officer of the CHC authorized the study to be conducted at the CHC. The HCPs provided their consent to participate in the study. Throughout the study, confidentiality and anonymity were preserved by ensuring that participants were completely informed about the purpose of the study and by eliminating any information that could potentially identify professionals when the results were reported.

Table 1. Socio-demographic characteristics.

Characteristic	Frequency	Percentage (%)
Age groups		
20 – 29 years	8	15.1
30 – 39 years	19	35.9
40 – 49 years	13	24.5
≥ 50 years	13	24.5
Mean 41 ± 11.3, Min = 20, Max = 64, Median = 42 Quartiles (Low = 31, Upper = 50)		
Gender		
Male	1	1.9
Female	52	98.1
Qualification		
Nursing diploma	40	75.5
Nursing degree	12	22.6
Enrolled	1	1.9
Experience		
Less than 5 years	14	26.4
Between 5 and 10 years	22	41.5
More than 10 years	17	32.1
Guidelines		
Informed	11	20.8
Not informed	42	79.2

3. RESULTS

3.1. Sociodemographic Profile

Most of the healthcare professionals in this study were in the age range of 30 to 39 years (35.9%). The age group of professionals aged 30 years and older accounted for 84.1% of the total professionals. Females, 52 (98.1%), comprised a larger proportion than males, with most having a diploma qualification and 8.8 years of experience as healthcare professionals (Table **1**).

3.2. Source of Information

Media sources, including radio, television, and magazines, comprised 49% of the common sources of information HCPs used for staying informed, followed by textbooks 25 (45, 5%) and consulting colleagues 17 (30.9%). Table **2** highlights sources of information used by the HCPs.

3.3. Awareness of Nutrition

Few HCPs, about 8 (15, 1%), were aware of the information concerning the timing of meals for type 2 diabetes patients. There was an equal proportion of HPCs, 27 (50%), who had information about the impact of carbohydrate-rich foods high in fibre in relation to glucose absorption and the best choice for a low-fat fibre meal.

HCPs, 32 (60.4%), were aware of the high fibre in the corn flakes, compared to 29 (58%), who were not aware that peanuts were high in fibre. There was an equal number of 25 (50%) of those who had and who did not have information that cabbage has high fibre. Table **3** shows the awareness of HPCs on food items high in fibre.

Most HCPs were aware that boerewors 51(98.1%) and mutton chops 48 (96%) are high in fats. However, most (91, 2%) were not aware that sunflower margarine was high in fat (Table **4**).

Table 2. Source of information.

Source	Frequency	Percentage (%)
Media Sources, including radio, television, magazines, *etc.*	27	49.1
Textbook	25	45.5
Colleagues	17	30.9
Conferences and workshops	14	25.5
Internet	14	25.5
Journal Articles	10	18.2
Friends	4	7.3
Others		
EDL	3	5.5
Church	2	3.6
In-service training	1	1.8

Table 3. Fibre food items.

Food Items Low/ High in Fibre	Correct (%)	Incorrect (%)
Chicken	46 (93.9)	3 (6.1)
Corn Flakes	32 (60.4)	21 (39.6)
Apple	32 (62.7)	19 (37.3)
Samp and beans	31 (56.4)	19 (38)
Cabbage	25 (50)	25 (50)
Peanuts	21 (42)	29 (58)

Table 4. Fatty food items.

Food Items Low/ High in Fat	Correct (%)	Incorrect (%)
Boerewors (sausage)	51 (98.1)	1 (1.9)
Mutton chops	48 (96)	2 (4)
Pilchards in tomato sauce	44 (84.6)	8 (15.4)
Amasi	38 (69.1)	14 (26.9)
Canola oil	36 (70.6)	15 (29.4)
Sunflower margarine	15 (27.3)	37 (91.2)

3.4. Awareness of Diabetes Self-management

Most HCPs, 39 (67.9%), were not aware of the importance of HbA1c and recommended guidelines on LDL cholesterol levels in type 2 diabetes patients comprising 48 (92.3%). Health professionals did not know what information to give to the patient with type 2 diabetes to know if their blood glucose was high/normal/low. The frequency of exercise in an overweight patient was not known by the 40 (75.5%) HCPs, and only 13 (24.5%) were aware. The awareness of HCPs regarding diabetes self-management is outlined in Table **5**.

3.5. Knowledge of HCPs on Nutrition and Diabetes Self-management

The majority of health professionals, 34 (64.1%), had poor knowledge scores, and about 18 (34%) had average knowledge. The knowledge score of most HCPs on nutrition and diabetes self-management was within the lower range, with a mean score of 16.5(0 – 36), with the upper quartile of 20, suggesting that most HPCs had low scores on knowledge (Table **6**).

Table 5. Diabetes self-management.

Diabetes Self-management	Correct (%)	Incorrect (%)
Insulin therapy is not contraindicated in overweight patients	34 (65.4)	18 (34.6)
Healthy eating and exercising patients do not require treatment	33 (62.3)	20 (37.7)
Most successful approach to diabetes self-management	32 (60.4)	21 (39.6)
According to guidelines recommended target waist circumference	29 (53.7)	25 (46.3)
Oral agents *vs.* insulin injection	22 (42.3)	30 (57.7)
Advice on what to do when blood glucose is high	22 (41.5)	31 (58.5)
Advance to the patient with a scratch on the foot	20 (37.7)	33 (62.3)
Insulin therapy is not an indication of advanced diabetes	19 (35.8)	34 (64.2)
Best advice to give to hypoglycaemic patient	17 (32.1)	36 (67.9)
Monitoring of HbA1c in patients with glucose within the target level	17 (32.1)	36 (67.9)
Optimal blood pressure control target according to guidelines	16 (30.2)	37 (69.8)
HbA1c reading in relation to fasting and pre-prandial glucose levels	14 (26.4)	39 (73.6)
Frequency of exercising in an overweight patient	13 (24.5)	40 (75.5)
Guidelines recommended LDL cholesterol levels	4 (7.7)	48 (92.3)
The way of patient knowing their glucose level	0 (0)	53 (100)

Table 6. Knowledge on nutrition and diabetes self-management.

Level of Knowledge	Frequency	Percentage (%)
0 - 17 (Poor)	34	64.1
18 - 27 (Average)	18	34
27 – 36 scores (Good)	1	1.9
Mean 16.5 ± 4.8, Min = 1, Max = 29, Median = 17 Quartiles (Low = 13, Upper = 20)		

Table 7. Level of knowledge with age group and experience.

Age Groups	Level of Knowledge			Total (%)
	0 - 17 (Poor) n(%)	18 - 27 (Average) n(%)	27-36 (Good) n(%)	
20 – 29 years	7 (87.5)	1 (12.5)	0 (0)	8 (100)
30 – 39 years	11 (57.9)	8 (42.1)	0 (0)	19 (100)
40 – 49 years	8 (61.6)	4 (30.8)	1 (7.4)	13 (100)
≥ 50 years	7 (53.9)	6 (46.1)	0 (0)	13 (100)
Total	33 (61.8)	18 (36.4)	1 (1.8)	53 (100)
Work experience				
< 5 years	12 (85.7)	2 (14.3)	0 (0)	14 (100)
5 - 10 years	12 (54.5)	9 (40.9)	1 (4.5)	22 (100)
> 10 years	8 (47.1)	9 (52.9)	0 (0)	17 (100)
Total	34 (61.8)	18 (36.4)	1 (1.8)	53(100)

Table 8. Level of knowledge with qualification and DM guidelines.

Level of Knowledge	Qualification		P-value
	Nursing Diploma n(%)	Nursing Degree n(%)	
0 - 17 (Poor)	26 (76.5)	8 (23.5)	0.007
18 - 27 (Average)	13 (86.7)	5 (13.7)	0.05
27 – 36 scores (Good)	1 (100)	0 (0)	N/A
Total	40	13	
Level of knowledge	**Awareness of the DM guideline**		**P-value**
	Aware	**Not aware**	
0 - 17 (Poor)	10 (24.4)	24 (75.7)	0.028
18 - 27 (Average)	1 (5.6)	17 (94.4)	0.012
27 – 36 scores (Good)	0 (0)	1 (100)	N/A
Total	11	42	

3.6. Knowledge of HCPs on Demographic Characteristics and DM Guideline

Healthcare professionals above the age of 50 years had the highest proportion with average knowledge than other healthcare professionals. The younger the health professionals, the poorer their knowledge. The more years of experience, the more knowledge they had. The less experience they had, the poorer their knowledge.

About 26 (76.5%) HCPs with a nursing diploma had poor and 13 (86.7%) had average knowledge scores than HCPs with a degree, p-value 0.007. Although HCPs with a nursing diploma were more than those with a nursing degree, their average knowledge was similar with p-value = 0.05. Table **7** indicates the demographics of HCPs with their level of knowledge.

As shown in Table **8**, most HCPs were not aware of the DM guideline p-value less than 0.028 and 0.012, respectively. The only participant with a good global knowledge score was also not aware of the DM guideline.

4. DISCUSSION

The current study provides a perspective on the knowledge of healthcare professionals on nutrition and diabetes self-management at a Community Health Centre in Tshwane district, South Africa. Overall, most of the HPCs scored poorly on the overall knowledge of nutrition and self-management of patients with diabetes. Several factors may contribute to the overall lack of knowledge. The findings of this study showed that the mean age of HCPs working at the CHC was 41 years, with an average of 8.8 years of working experience and a diploma qualification. The study by Farzaei *et al*. [27] in Iran, which investigated the knowledge, attitude, and practices of nurses on nutrition and diabetes self-management, showed that the average age of nurses was 30 years, held a bachelor's degree, and had 7 years of work experience. The research was carried out at a tertiary hospital, and a bachelor's degree was the criterion for inclusion. This explains why a greater proportion of the nurses in that study held a higher qualification than in this study. This research may have observed a higher mean age due to the preference of younger nurses to work in tertiary hospitals, primarily located in cities, as opposed to clinics in townships or rural areas. Demographic characteristics are not determinants of higher knowledge scores in nurses, although HCPs who were older showed better scores than younger ones. Healthcare professionals reported using media sources to stay informed, as evidenced by 49.1% who cited using radio, television, and magazines as their primary source of information. Media sources are easily accessible and convenient; however, they lack the rigor and detailed evidence found in scientific journals [28]. Access and/or use of scientific journals among HCPs in the study appeared to be limited, with only 18.2% reporting access. This may suggest that HPCs either have limited access and/or a lack of habit in consulting scientific journals.

Additionally, educational qualifications played a role, with nursing degree-holders demonstrating better knowledge scores compared to those with diplomas. Similarly, studies by Samancioglu *et al*. [29] and Farzaei *et al*. [11] conducted in Turkey and Iran, respectively, also found poor and moderate knowledge scores amongst nurses on nutrition and diabetes self-management, with only 4% of nurses receiving post-university training on diabetes.

Regarding self-management, some areas show moderate understanding, but many critical aspects, such as glucose monitoring, exercise recommendations, and understanding HbA1c and LDL levels, are poorly understood by healthcare professionals. This knowledge deficit can severely impact the effectiveness of diabetes management and patient outcomes. Kgangale and Marincowitz [30] conducted a similar study in Limpopo, South Africa, in which they found that nurses demonstrated suboptimal knowledge scores on insulin therapy, oral diabetes medications, nutrition, blood glucose monitoring, complications, and management of symptoms. Certain aspects of diabetes mellitus management remained problematic, as indicated by the moderate overall knowledge score in the findings of this study [13].

Choi *et al*. [31], in their study on the national prevalence and trends in food labelling awareness during the COVID-19 pandemic in South Korea, 2014-2022,"

showed how food labelling practices evolved over time and were affected by the COVID-19 pandemic. It highlights significant shifts in consumer awareness and behaviour, influenced by the pandemic's emphasis on health and safety. Effective self-management of diabetes requires informed dietary choices, which may be influenced by label awareness and comprehension. Poor food label understanding could hinder the ability of patients to make healthier dietary decisions, which is crucial for managing chronic conditions like diabetes. Healthcare professionals, especially in areas with limited access to dietary information or referral to other specialists, should consider food label literacy in patient education as part of comprehensive diabetes care.

CONCLUSION

The findings in this study highlight significant gaps in the knowledge of healthcare professionals on nutrition and diabetes self-management at CHC, which can negatively impact diabetes management. Most HCPs demonstrated poor knowledge in key areas crucial for effective diabetes management. Knowledge levels were positively correlated with age and experience, with older and more experienced healthcare professionals demonstrating average levels of knowledge. Additionally, educational qualifications were a factor, with nursing degree holders generally showing better results compared to those with diplomas. Both age and educational qualifications, while influential, are not the sole determinants of knowledge proficiency.

RECOMMENDATIONS

1. Healthcare managers at community health centre should prioritize the provision of ongoing workshops and training sessions for healthcare professionals that are specifically designed to address recent guidelines and best practices in diabetes management, such as food labelling literacy.

2. They should encourage interdisciplinary collaboration among healthcare professionals, such as nurses, physicians, dietitians, and endocrinologists, to advance comprehensive diabetes management.

3. Periodic assessments and quality improvement initiatives should be implemented to ensure that educational interventions and healthcare practices are monitored for their effectiveness in managing diabetes.

LIMITATIONS OF THE STUDY

The study's findings, limited by a small sample size and focus on a single health facility in Tshwane district, South Africa, offer valuable insights into healthcare professionals' knowledge at the Community Health Centre, cautioning against broad generalizations to other settings or regions. Information bias may have affected results due to participants' self-perception despite efforts to maintain anonymity and confidentiality. The cross-sectional design hinders causal inference and longitudinal assessment, suggesting future research should employ larger, multi-facility samples and longitudinal or mixed-method designs to better understand knowledge acquisition and its impact on patient outcomes. The researchers also acknowledge that healthcare professionals were not assessed on their knowledge in relation to self-care practices, such as blood sugar level assessment, plant-based food consumption, physical activity, medication adherence, maintaining healthy behaviour, and risk factor reduction, which could be considered a significant limitation of the study. These practices are crucial elements in managing type 2 diabetes effectively according to guidelines. By not assessing these practices, the study fails to provide a holistic view of diabetes self-management and its effectiveness. It limits the understanding of how well healthcare providers are addressing these critical aspects of care, which are essential for preventing complications and improving patient outcomes. Future studies should consider a more holistic assessment of healthcare professionals' knowledge and its application to diabetes care, especially in resource-limited countries where referral to other specialties is limited.

AUTHORS' CONTRIBUTIONS

K.E.H and G.A.O: Supervisors provided significant guidance and oversight during the research process; D.T.: was responsible for the design and development of the study, data collection and analysis, and dissertation writing; C.D.K.: Provided the initial draft of this manuscript.

LIST OF ABBREVIATIONS

DM	=	diabetes mellitus
T2DM	=	type 2 diabetes mellitus
NCD	=	noncommunicable disease
CHC	=	Community Health Centre
SMUREC	=	Sefako Makgatho University Research Ethics Committee

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study received ethical approval from the Sefako Makgatho University, Pretoria, South Africa. Research Ethics Committee (SMUREC) prior to the study being conducted at the CHC, reference number SMUREC/M/93/2017:PG

HUMAN AND ANIMAL RIGHTS

All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committee and with the 1975 Declaration of Helsinki, as revised in 2013.

CONSENT FOR PUBLICATION

The HCPs provided their consent to participate in the study. Throughout the study, confidentiality and anonymity were preserved by ensuring that participants were completely informed about the purpose of the study and by eliminating any information that could potentially identify professionals when the results were reported.

STANDARDS OF REPORTING

STROBE guidelines and methodology were followed.

AVAILABILITY OF DATA AND MATERIALS

All data generated or analysed during this study are included in this published article.

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None.

CONFLICT OF INTEREST

The author(s) declare no conflict of interest, financial or otherwise.

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DECLARATION

The opinions and conclusions expressed in this study are those of the authors and do not necessarily reflect the views or policies of the Community Health Centre, Tshwane District Health Department, any other institutions associated with it, and the publisher. The views and opinions expressed are for research purposes only and should not be used as a substitute for professional medical advice, diagnosis, or treatment. The views and data presented in this study are solely based on the research objectives of this research study.

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