Sokoine University of Agriculture

MSc Dissertation

Satisfaction and Compliance to Recommended Management Practices among Type 2 Diabetes Patients in Morogoro Municipality, Tanzania

Hasna R. Bofu

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SATISFACTION AND COMPLIANCE TO RECOMMENDED MANAGEMENT PRACTICES AMONG TYPE 2 DIABETES PATIENTS IN MOROGORO MUNICIPALITY, TANZANIA

Dissertation Submitted to Sokoine University of Agriculture in Partial Fulfilment of the Requirements for the Degree of Master of Science in Human Nutrition

By

Hasna R. Bofu

Supervisors
Dr. Akwilina W. Mwanri
Dr. Safiness S. Msollo

Department of Human Nutrition and Consumer Sciences
College of Agriculture
Sokoine University of Agriculture, Morogoro, Tanzania

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EXTENDED ABSTRACT

The prevalence of type 2 diabetes mellitus has been increasing primarily due to the rising of risk factors such as sedentary lifestyles and unhealthy eating habits, resulting to overweight and obesity. Diabetes-related complications are the major causes of morbidity and mortality among people with type 2 diabetes mellitus. Changes in lifestyles and dietary patterns are essential for the management of type 2 diabetes mellitus, including regular physical exercises, smoking cessation, weight management, and diet control, which help to mitigate the long-term effects of diabetes. Patient counseling has been identified as an important means to enhance patients' knowledge about risk factors, lifestyle modifications, and diabetes-related complications, which can influence adherence to recommended management practices. Little is known on counselling practices, satisfaction of diabetes related health care services received and adherence to recommended prevention and management practices among type 2 diabetes patients. Thus, the present study aimed to evaluate counseling practices, challenges and satisfaction with the services provided among type 2 diabetes patients. It also assessed compliance to recommended management practices for prevention and management of the disease related complications in selected health facilities in Morogoro Municipality, Tanzania. A hospital-based cross-sectional study was conducted from February to May 2023 among 140 patients, including those diagnosed with type 2 diabetes for at least 3 months and receiving healthcare services in selected diabetes clinics. Two health facilities with diabetes clinics which are Sabasaba Health Centre and Morogoro Regional Referral Hospital, were purposively selected to represent public health facilities with diabetes clinics. Data were collected through face-to-face interviews using a structured questionnaire that included patients' characteristics. Additionally, a previously validated Summary of Diabetes Self-care Activities questionnaire was used to assess patients' compliance with recommended prevention and management practices, and a Diabetes Clinic Satisfaction Questionnaire was used to assess services satisfaction. Data were analysed using Statistical Package for Service Solutions, version 25. Descriptive statistics and appropriate significance tests such as mean, frequencies, percent and standard deviations (SD)

were obtained. Multivariable logistic regression analysis was employed to identify factors influencing services satisfaction and those that are associated with compliance with recommended prevention and management practices. The study commenced after receiving ethical approval from National Health Research Committee of the National Institute for Medical Research. Permission to conduct this study was also sought from the President's Office Regional Authority and Local Government, as well as the respective regional, district, and health facility authorities. The mean age of the respondents was 59±12 years, with 65% (n=91) being females, and 62% (n=87) having completed primary-level education. Almost all respondents 96% (n=135) acknowledged receiving advice on medication and healthy diet. Advice on adopting a healthy lifestyle was not mandatory, with approximately one in four respondents never having received counseling on either alcohol intake or tobacco use. Nearly half of the respondents (49%, n=68) expressed satisfaction with the services offered. There was a significant association between patient satisfaction and the duration of living with type 2 diabetes mellitus (AOR 2.2, 95% CI: 1.1-4.4), marital status (AOR 2.1, 95% CI: 1.2-4.8), and waiting time to receive services in the healthy facility (AOR 0.76, 95% CI: 0.6-0.9). Diabetes services were mostly limited to large patient-load and shortage of trained healthcare providers, private space and time, as well as lack of guidelines and protocol for counseling. Findings also revealed that among the 140 patients, 91.4% (n=128) exhibited poor or unsatisfactory self-care practices, with an overall mean of 3.81±2.08 days per week for diabetes management. Self-care practices with good or satisfactory performance included non-smoking, not drinking alcohol, and using prescribed medication, while unsatisfactory performance was observed on the practices of self-monitoring of blood glucose and physical activity. Multiple regression analysis indicated that having co-morbidities (AOR 4.5, 95% CI: 1.14-18.02) and being employed (AOR 4.4, 95% CI: 1.25-15.44) were independently predictive of adherence to self-care practices. Generally, this study shows moderate satisfaction with counseling practices and services, as well as poor compliance to recommended prevention for complications and management practices. Self-monitoring of blood glucose, physical exercise, and dietary practices were the least practiced aspects, which could potentially increase the risk of complications among patients with type 2 diabetes. The government through the Ministry of Health and other stakeholders should ensure the formulation of clear protocol and guidelines for counseling and diabetes prevention and management. It is further suggested that recommended practices should be integrated into existing healthcare systems to ensure that they become a routine part of care.

IKISIRI KUU

Ueneaji wa ugonjwa wa kisukari cha aina ya pili umekuwa ukiongezeka hasa kutokana na ongezeko la mitindo mibaya ya maisha kama vile kutokufanya mazoezi na ulaji usiofaa, hivo kusababisha uzito uliozidi na unene. Matatizo yanayohusiana na kisukari ndio sababu kuu za magonjwa na vifo miongoni mwa watu walio na ugonjwa wa kisukari cha aina ya pili. Mabadiliko ya mtindo wa maisha na tabia za ulaji ni muhimu katika kudhibiti ugonjwa wa kisukari cha aina ya pili, ikiwa ni pamoja na ufanyaji mazoezi ya mwili mara kwa mara, kuacha kuvuta sigara, kudhibiti uzito na ulaji, ambavyo husaidia kupunguza athari za muda mrefu za ugonjwa wa kisukari. Unasihi kwa wagonjwa umetambuliwa kama njia muhimu ya kuongeza uelewa wa wagonjwa kuhusu viashiria vya hatari vya ugonjwa, marekebisho ya mtindo wa maisha, na matatizo yanayohusiana na kisukari, ambayo yanaweza kuongeza utekelezaji wa mienendo iliyopendekezwa katika kudhibiti ugonjwa wa kisukari. Machache yanajulikana juu ya unasihi, kuridhika na huduma za afya zinazohusiana na kisukari, na uzingatiaji wa mienendo iliyopendekezwa kuhusu kuzuia na kudhibiti ugonjwa wa kisukari, miongoni mwa wagonjwa wa kisukari cha aina ya pili. Hivyo, utafiti huu ulilenga kutathmini mbinu za ushauri nasihi, changamoto na uridhikaji wa huduma zinazotolewa kwa wagonjwa wa kisukari cha aina ya pili na kutathmini uzingatiaji wa mienendo iliyopendekezwa ya kuzuia na kudhibiti matatizo yanayohusiana na ugonjwa huo katika baadhi ya hospitali zilizochaguliwa katika Manispaa ya Morogoro, Tanzania. Utafiti huu ulifanyika kuanzia Februari hadi Mei 2023 ukihusisha wagonjwa 140 wale ambao waligunduliwa kuwa na ugonjwa wa kisukari cha aina ya pili kwa angalau miezi mitatu iliyopita kabla ya utafiti na kupokea huduma za afya katika kliniki za wagonjwa wa kisukari zilizochaguliwa. Hospitali mbili zenye kliniki za kisukari, ambazo ni Kituo cha Afya cha Sabasaba na Hospitali ya Rufaa ya Mkoa wa Morogoro, zilichaguliwa kwa makusudi kuwakilisha hospitali za umma zenye kliniki za kisukari. Taarifa zilikusanywa kupitia mahojiano ya ana kwa ana kwa kutumia dodoso

lililojumuisha sifa za wagonjwa. Zaidi ya hayo, dodoso lililothibitishwa lilitumika kutathmini uzingatiaji wa wagonjwa juu ya mienendo iliyopendekezwa ya kuzuia na kudhibiti athari za ugonjwa wa kisukari cha aina ya pili, na dodoso la uridhikaji wa huduma za afya na unasihi miongoni mwa wagonjwa wa kisukari lilitumika kutathmini jinsi gani wagonjwa wanaridhika na huduma zinazotolewa. Taarifa zilichanganuliwa kwa kutumia "*Statistical Package for the Social Sciences*", toleo la 25. Takwimu za kuelezea idadi, asilimia na wastani zilitafutwa. Jaribio la kitakwimu la "*multivariable logistic regression analysis*" lilitumika kutambua sababu zinazohusiana na kufuata mienendo iliyopendekezwa ya kuzuia na kudhibiti ugonjwa wa kisukari, pamoja na sababu zinazochangia kuridhika na huduma. Utafiti ulianza baada ya kupata idhini ya maadili ya kiutafiti kutoka kwa Kamati ya Taifa ya Tafiti ya Taasisi ya Taifa ya Tafiti za Afya. Pia, idhini ya kufanya utafiti huu ilipatikana kutoka kwa mamlaka ya Ofisi ya Raisi ya Tawala za Mikoa na Serikali za Mitaa, pamoja na mamlaka husika za mikoa, wilaya, na hospitali. Wastani wa umri wa washiriki ulikuwa miaka 59±12, ambapo 65% (n=91) walikuwa wanawake, na 62% (n=87) walikuwa wamemaliza elimu ya msingi. Takribani washiriki wote 96% (n=135) walikiri kupokea ushauri juu ya matumizi sahihi ya dawa na kuzingatia ulaji unaofaa. Ushauri wa kuchagua mtindo bora wa maisha haukuwa lazima, ambapo takribani mmoja kati ya wagonjwa wanne walikiri kuwa hawajawahi kupokea ushauri kuhusu matumizi ya pombe au ya tumbaku. Karibu nusu ya washiriki (49%, n=68) walisema kuwa wanaridhika na huduma zilizotolewa. Kulikuwa na uhusiano kati ya kuridhika kwa mgonjwa na muda ambao ameishi na ugonjwa wa kisukari (AOR 2.2, 95% CI: 1.1- 4.4), hali ya ndoa (AOR 2.1, 95% CI: 1.2-4.8), na muda wa kusubiri kupata huduma katika hospitali (AOR 0.76, 95% CI: 0.6-0.9). Huduma kwa wagonjwa wa kisukari zinakabiliwa zaidi na changamoto ya uwepo wa wagonjwa wengi wanaohitaji huduma kwa wakati mmoja na upungufu wa watoa huduma wenye ujuzi na mafunzo ya kutosha. Changamoto nyengine ni kukosekana kwa eneo la faragha lililotengwa kwa ajili ya ushauri, muda mchache wa kutoa huduma, pamoja na kukosekana kwa mwongozo na taratibu za unasihi. Pia, matokeo yalionyesha kati ya wagonjwa 140, asilimia 91 (n=128) walionesha mienendo hafifu au isiyoridhisha juu ya uzingatiaji wa mienendo iliyopendekezwa ya kuzuia na kudhibiti ugonjwa wa kisukari cha aina ya pili. Mienendo ya kuzuia na kudhibiti ugonjwa wa kisukari cha aina ya pili, yenye uzingatiaji mzuri au wakuridhisha yalijumuisha kutovuta sigara, kutokunywa pombe, na matumizi sahihi ya dawa. Aidha, uzingatiaji usioridhisha ulionekana katika mienendo ya kupima kiwango cha sukari kwenye damu na kufanya mazoezi. Jaribio la takwimu la "*multivariable logistic regression analysis*" lilionyesha kwamba kuwa na magonjwa mengine sugu yasiyoyakuambukiza (AOR 4.5, 95% CI: 1.14-18.02) na kuwa na ajira rasmi (AOR 4.4, 95% CI: 1.25-15.44) kuna uhusiano mkubwa na kufuata mienendo ya uzingatiaji iliyopendekezwa. Kwa ujumla, utafiti huu unaonyesha kuridhika kwa wastani kwa ushauri na huduma zinazotolewa kwa wagonjwa wa kisukari cha aina ya pili, pamoja na uzingatiaji hafifu wa mienendo iliyopendekezwa kwa ajili ya kudhibiti matatizo yatokanayo na ugonjwa wa kisukari. Uzingatiaji binafsi wa kupima kiwango cha sukari kwenye damu, mazoezi ya mwili, na ulaji unaofaa yalikuwa ni hafifu au yasiyoridhisha, ambayo yanaweza kuongeza hatari ya matatizo kwa wagonjwa wenye kisukari cha aina ya pili. Serikali kupitia wizara ya afya na wadau wengine wahakikishe kuwa kuna mwongozo na taratibu mbalimbali za unasihi ikiwemo namna ya kuzuia na kudhibiti ugonjwa wa kisukari. Pia utafiti huu unapendekeza kwamba unasihi juu ya mienendo iliyopendekezwa ijumuishwe katika mifumo ya huduma za afya ili kuhakikisha kuwa yanakuwa sehemu ya kawaida ya huduma za afya.

DECLARATION

I, **HASNA R. BOFU**, do hereby declare to the senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

__________________________ ________________

Hasna R. Bofu Date

(MSc. Human Nutrition candidate)

The above declaration is confirmed by;

__________________________ ________________

Dr. Akwilina Wendelin Mwanri Date

(Supervisor)

__________________________ ________________

Dr. Safiness Simon Msollo Date

(Supervisor)

LIST OF MANUSCRIPTS

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CHAPTER ONE

1.0 GENERAL INTRODUCTION

1.1 Background Information

Non-communicable diseases (NCDs) pose a significant global health challenge, representing a diverse range of chronic conditions that contribute substantially to morbidity and mortality (Ngaruiya *et al.,* 2022). These diseases are responsible for 41 million deaths annually, accounting for 74% of global mortality rate (World Health Organization [WHO], 2023). Among them, Type 2 diabetes mellitus (T2DM) emerges as a pressing concern. Risk factors such as tobacco use, lack of physical activity, excessive alcohol consumption, unhealthy eating habits, overweight and obesity increase the likelihood of dying from NCDs (Motala *et al.,* 2022; Peters *et al.,* 2019).

Type 2 diabetes mellitus formerly called non-insulin dependent or adult-onset results from the ineffective use of insulin in the body (WHO, 2019). Approximately 10.5% (537) million individuals worldwide currently have diabetes, and it is anticipated that this figure will increase to 11.3% (643) million by 2030 and 12.2% (783) million by 2045 (International Diabetes Federation [IDF] (2021). In Sub-Saharan Africa (SSA), the region is projected to experience the highest increase in T2DM rates, with an estimated 129% rise by 2045 if no prevention measures are implemented (Saeedi *et al.,* 2019). This alarming trend is expected to worsen the already high prevalence of T2DM complications and comorbidities in SSA, where the current prevalence is 4.7% (Ekoru *et al.,* 2019; Saeedi *et al.,* 2019). The rise in prevalence of T2DM in SSA is driven by aging population, increasing urbanization and rapid economic developments, nutrition transition and lifestyle changes (Motala *et al.,* 2022; Onyango, 2018). In Tanzania, about 2.9 million people are living with diabetes and mostly found in urban areas (IDF, 2021).

The increase in prevalence of T2DM have resulted in a rise of diabetes related complications including nephropathy, eye damage (retinopathy) and nerves damage (neuropathy), cardiovascular diseases, stroke and leg amputation (Tomic *et al.,* 2022; WHO, 2019). These complications raise healthcare expenses and lower the overall quality of life. It is estimated to cost national direct costs of diabetes, which differ between countries ranging from $3.5 billion to $4.5 billion annually (Mutyambizi *et al.,* 2018). Factors such as healthcare systems, prevalence, treatment and management approaches likely contribute to these differences (Ong *et al.,* 2018).

Management of Type 2 diabetes involves a multifaceted approach and compliance to the management practices plays a crucial role in achieving optimal health outcomes (Richardson *et al.,* 2021). These practices encompass lifestyle modifications and pharmacotherapy (WHO, 2023; Powers *et al.,* 2020). Lifestyle changes, including diet modifications and regular exercise, play a crucial role in glycemic control (Syeda *et al.,* 2023; Kirwan *et al.,* 2017). Medications, ranging from oral antidiabetic drug to insulin therapy is tailored to individual needs, aiming to maintain blood glucose levels within a target range (American Diabetes Association [ADA] (2020); Chaudhury *et al.,* 2017).

Prevention strategies are crucial in addressing the growing prevalence of T2DM. Identifying individuals at high risk and implementing interventions, such as weight management and regular screenings, form integral components of preventive measures (Gruss *et al.,* 2019). Public health initiatives, emphasizing awareness, healthy lifestyle, and early detection, are instrumental in mitigating risk factors and long-term diabetes related comorbidities and complications (Shirvan *et al.,* 2021; Budreviciute *et al.,* 2020).

In clinical practice, adherence to recommended management protocols among healthcare providers (HCPs) is vital for optimal outcomes for patients with T2DM (Lu *et al.,* 2020). The commitment of healthcare professionals to follow evidence-based guidelines fosters better glycemic control, reduces the risk of complications, and enhances overall patient well-being in the management of T2DM (Saher *et al.,* 2022). Organisations like the American Diabetes Association (ADA), the International Diabetes Federation (IDF) and World Health Organization (WHO) regularly update guidelines based on scientific research to provide healthcare professionals with the most effective approaches to diabetes management. Evidence-based guidelines for diabetes care often include recommendations such as repeated counseling on lifestyle modifications, blood glucose monitoring, medication management, and regular screenings (ADA, 2022; IDF, 2017; WHO, 2012). However, access to recommended diabetes care in SSA, including Tanzania, is often limited to inadequate healthcare infrastructure, shortage of healthcare professionals, limited financial resources, and challenges in the distribution of medical supplies such as anti-diabetic drugs, insulin, glucometer and diagnostic test strips (Birabwa *et al.,* 2019; Mwangome *et al.,* 2017). Additionally, low health literacy and cultural beliefs can further contribute to the challenges in implementing and adhering to recommended management protocols for diabetes (Lutala & Muula, 2022).

People with diabetes can live long and healthy life if disease is detected earlier and well managed which can potentially prevent complications and pre-mature deaths (WHO, 2016). Patients counseling therefore can be helpful in improving health outcome of diabetes patients. Thus, there is a need for routine health education and counseling program to people with diabetes. Routine education and counseling will help to enhance patients' adequate knowledge on diseases status, management of risk factors, lifestyle modification and complications which are important to improve and enhance patients' aptitude for making decision and complying with diet, exercises and medication for disease management.

1.2 Problem Statement and Justification of the Study

1.2.1 Problem statement

According to STEPS survey (2012), the prevalence of T2DM in Tanzania was 9.1% (Mayige & Kagaruki, 2013), which may be higher in the near future due to increasing prevalence of overweight and obesity especially among women of reproductive age (Ministry of Health [MoH] *et al.,* 2023). There is variation across the regions, with other regions having much higher prevalence than others. The highest prevalence of T2DM was reported in Kilimanjaro (21.6%) and Arusha (16.2%) (Stanifer *et al.,* 2016; Masaki *et al.,* 2015) and the lowest prevalence was reported in Dodoma (11.8%) and Mwanza (11.9%) (Munyogwa, 2015; Ruhembe *et al.,* 2014).

There have been a number of initiatives in Tanzania to improve identification, prevention, and management of T2DM to reduce subsequent morbidity, mortality, and costs. The initiatives include the national strategies and action plan for the prevention and control of NCDs of 2016-2020 (MoH, 2016). The plan focuses on NCDs like T2DM, advocate for healthy lifestyles and reinforce monitoring and evaluation systems. Also, there is establishment of diabetes care clinics in different health facilities.

Despite of the activities done to improve the care of patients with T2DM, knowledge and awareness of diabetes among patients remains a major challenge in Tanzania with only a minority of patients who are aware of their diabetes status including those who are actively treated (Osetinsky *et al., 2022*; Stanifer *et al.,* 2016; Munyogwa, 2015). This needs to be urgently addressed given the morbidity, mortality, and costs associated with diabetes (Lewis *et al.,* 2018; Rwegerera *et al.,* 2018). Several studies indicated that inadequate knowledge of patients to the recommended prevention and management practices is associated with more complications and co-morbidities (Abdulrahman *et al.,* 2020; Pratama *et al.,* 2019; Maja *et al.,* 2018).

Counseling services are crucial components of T2DM management, providing essential support for individuals navigating the complexities of their condition (Pon *et al.,* 2019; Zhang *et al.,* 2019). Patient education and counseling have emerged as key factors and means for promoting knowledge and understanding, self-care, and sustained compliance to recommended practices (Bhattad & Pacifico, 2022). The effectiveness of management of T2DM is influenced by patient satisfaction. Patient satisfaction with healthcare services plays a key role as a primary indicator of quality in evaluating healthcare services. Moreover, it serves as a valuable means for identifying specific areas that require improvements (Ferreira *et al.,* 2023). Hence, there is a need to evaluate overall counseling services for improving knowledge, health and quality of life.

1.2.2 Justification of the study

Type 2 diabetes mellitus brings enormous impact as it often affects working age people leading to loss of manpower, lower productivity and participation rate, high healthcare costs and financial insecurity (Marthias *et al.,* 2021). Counseling services are among the preventive services for secondary prevention of T2DM.

Most studies on T2DM in Tanzania have focused on prevalence and risk factors, diabetes related complications, knowledge and awareness (Osetinsky *et al., 2022*; Damian *et al.,* 2017; Stanifer *et al.,* 2016). However, little is known on counseling practices, satisfaction of diabetes related health care services received among T2DM patients and adherence to recommended prevention and management practices. Hence, this study was undertaken to assess counselling practices and compliance of the T2DM patients to the recommended practices for the prevention and management of the disease complications.

The finding of this study will add value to the policy makers to promote health education program and counseling services. The emphasis will be on preventing complications and reducing deaths caused by diabetes, aligning with the Sustainable Development Goal (SDG) target 3.4, that aimed at preventing premature death through treatment, prevention and management and ensuring health and wellbeing of population in the country (United Nation [UN], 2015).

Furthermore, this study will help to strengthen counseling services and management of T2DM hence, reducing health expenditures and economic burden to the patients, family, community and the health systems. It will also improve productive capacity for the people in the country as one of the objectives of the national five year development plan (Ministry of finance and planning [MoFP], 2022).

1.3 Objectives of the Study

1.3.1 General objective

To evaluate counseling practices and compliance to the recommended management practices among T2DM patients in selected health facilities in Morogoro region, Tanzania.

1.3.2 Specific objectives

i. To assess satisfaction to the counseling services among T2DM patients in selected clinics in Morogoro municipality.
ii. To assess compliance to recommended practices and proper diabetes management among T2DM patients in selected clinics in Morogoro municipality
iii. To identify barriers to effective counseling for T2DM in Morogoro municipality.

1.4 Organization of the Dissertation

There are five chapters in this dissertation. Chapter one covers the general introduction of the study that provides context and give justification for conducting the study. Chapter two and three are organized in publishable manuscripts. Chapter two presents the first manuscript that addressed the first and the third objective on satisfaction of the patients to the counseling practices and services, and the barriers on delivery of diabetes care services at the health facilities. Chapter three covers the second manuscript that addressed the second objective on assessment of compliance of the T2DM patients to recommended management and prevention practices. Chapter four has the general discussion synthesized from all findings of the study. Chapter five gives conclusions and recommendations based on the research findings.

CHAPTER TWO

MANUSCRIPT ONE

2.0 Counseling Practices and Services Satisfaction among Type 2 Diabetes Patients in Morogoro Municipality, Tanzania.[1]

*Hasna R. Bofu[1], Akwilina Wendelin Mwanri[1] and Safiness Simon Msollo[1]

[1]Department of Human Nutrition and Consumer Sciences, Sokoine University of Agriculture, Po. Box 3006, Chuo Kikuu, Morogoro-Tanzania

***Correspondence:** hasnabofu@gmail.com

Abstract

Background: Adequate counseling is vital for improving health among type 2 diabetes mellitus. This study, aims to evaluate counseling services offered, and satisfaction among type 2 diabetes patients in Morogoro municipality, Tanzania.

Methods: This was a mixed methods cross-sectional study using structured face-to-face interviews with 140 patients diagnosed with type 2 diabetes within at least three months prior to the survey and receiving health care services in selected clinics. The questionnaire covered patient demographics, counseling services, and employed the Diabetes Clinic Satisfaction Questionnaire. In addition, key informant interviews were conducted to obtain health care provider views on diabetes care services they offer to patients and the associated challenges. Logistic regression was used to determine factors influencing service satisfaction and thematic analysis was used to identify views of healthcare providers.

[1] The material contained in this chapter has been submitted to African journal of health Sciences

Results: Out of 140 patients, 65% were females, 62% were married, and were above 50 years of age. About one in 4 respondents had never received counseling on alcohol or tobacco use. Approximately 49% expressed satisfaction with services offered. Diabetes services were mostly limited to large patient-load and shortages of trained healthcare providers, private space and time for counselling, lack of guidelines and protocol for counseling. Patient satisfaction was significantly associated with diabetes duration (AOR 2.2, 95% CI: 1.1-4.4), marital status (AOR 2.1, 95% CI: 1.2-4.8), and service waiting time (AOR 0.76, 95% CI: 0.6-0.9).

Conclusion: This study revealed moderate counseling practices and service satisfaction among type 2 diabetes patients. It also revealed counseling challenges including lack of clear protocols and guidelines. The Government and other stakeholders should ensure that clear protocols and guidelines are formulated and established for various healthcare practices. It is further suggested that recommended practices be integrated into existing healthcare systems to ensure that they become a routine part of care.

Keywords: Type 2 diabetes, counseling, services satisfaction, Tanzania

2.1 Introduction

The prevalence of type 2 diabetes (T2DM) is increasing and the rate is higher in developing than developed countries (World Health Organization [WHO], (2019). The International Diabetes Federation [IDF] (2021), projected that the global number of people with diabetes will rise from 537 million to 643 million by 2030 and further783 million by 2045. Additionally, more than three-quarters of adults with diabetes reside in low- and middle-income countries.

Type 2 diabetes mellitus constitutes approximately 90% of diabetes cases in Sub-Saharan African region, with current prevalence estimates ranging from 2.1 and 6.0%, and the number of individuals affected is expected to double within the next 25 years (Cho *et al.,* 2018). Sub Saharan African countries with high number of people with T2DM include South Africa (4.2 million), Nigeria (3.6 million), United Republic of Tanzania (2.9 million), Ethiopia (1.9 million) and Democratic Republic of Congo (1.9 million) (IDF, 2021). The increase is attributed to factors like population aging, rapid economic development and rising urbanization, which contributed to more sedentary lifestyles, excessive alcohol intake, tobacco use and increased consumption of unhealthy foods associated with obesity (Motala *et al.,* 2022; Onyango, 2018).

Patients counseling has been identified as an important means to enhance patients' knowledge. Adequate patients' knowledge on their disease's status, risk factors, medication, lifestyle modifications adherence and complications associated with T2DM is crucial. This knowledge can enhance improvements in self-management which form an important part of treatment plan so that individuals with T2DM can meet their goals (Baral *et al.,* 2021; Zhang *et al.,* 2019; Renuga *et al.*, 2016). Different studies indicated that inadequate knowledge of patients on diabetes status, compliance to lifestyle modifications and its management is associated with an overweight and obesity. It also leads to prolonged use of pharmacological treatment, and more complications and co-morbidities (Shawahna *et*

al., 2021; Mekonnen *et al.,* 2020).
Patients' satisfaction with healthcare services is an indicator in evaluating the quality of health care services. This can be used in identifying aspects that can be used to improve health as a greater satisfaction has been found to be associated with higher rates of adherence and compliance to recommended treatment regimens (Farahat *et al.,* 2016). Though, access to recommended diabetes care in most SSA countries and Tanzania in particular is constrained due to a scarcity of adequately trained healthcare providers (HCPs), high work load among health care providers, cultural belief, poor knowledge on diabetes self-care among patients, and lack of guidelines and protocols for counseling (Adhikari *et al.,* 2021; Ugwu *et al.,* 2020; Mwangome *et al.,* 2017).

Little is known on counseling services offered, barriers encountered by health care providers and T2DM patients' satisfaction in Tanzania (Munyogwa *et al.,* 2020; Mwangome *et al.,* 2017). Thus, the current study aims to evaluate counseling services offered, and satisfaction among type 2 diabetes patients as well as barriers to effective counseling. The findings will help in shedding light on strategies to enhance the effectiveness of counseling in the context of T2DM care.

2.2 Methodology

2.2.1 Study area description, design and population

The cross-sectional study was carried out in urban areas of Morogoro region between February and May 2023. Morogoro municipality was selected purposively due to fast-growing as it is a central connection to the Southern highlands, Central and Lake Zones. Morogoro is one of the 31 administrative regions in Tanzania. It is the second largest region in the country after Tabora region. It's made up of nine districts council (DC) namely Morogoro urban (municipality), Ifakara (Town Council), Morogoro (District Council), Kilosa (DC), Malinyi (DC), Mlimba (DC), Gairo (DC), Mvomero (DC), and Ulanga (DC). The regional capital is the municipality of Morogoro. Health services in the region are mainly by the government and faith-based organizations with 452 operating health facilities (18 hospitals, 53 health centers, and 381 dispensaries) (District Health Information System [DHIS], (2021). The national population census of 2022 reported that the estimated total population of Morogoro region was 3 197 104 whereby the rural proportion was 1 947 832 and urban proportion was 1 249 272 where 1 579 869 are males and 1 617 235 are females (Ministry of finance and planning [MoFP], (2022). This study included patients who were diagnosed with T2DM within three months or more and who are receiving health care services in selected diabetes clinics. Type 2 diabetes patients who had hearing or speech problems and those who were critically ill to respond to the questions were excluded from the study.

2.2.2 Sample size and sampling procedures

A sample size was estimated by using the formula as adopted from Kothari (2004). Based on the prevalence of T2DM in Tanzania (STEP-SURVEY) of 9.1% (Mayige & Kagaruki, 2013), the standard normal distribution of 95% and absolute error of 5% were used to obtain the sample size of 127 T2DM patients. After adjusting for a non-response rate of 10% the total sample size was 140. The two public health facilities with diabetes clinic which are Sabasaba health centre and Morogoro regional referral hospital were purposively selected as they accommodate majority of the patients in Morogoro Municipal. About 15 patients attended the diabetes clinic per day at Morogoro regional referral hospital and about 5 patients at Sabasaba health centre. Simple random sampling technique was used to select patients from the register list. About 15 patients from the two hospitals who met inclusion criteria and consented to participate were interviewed in a day. To acquire a total sample of 140 T2DM patients in two hospitals, proportionate sampling technique was applied where by 80% of the T2DM patients were selected from Morogoro regional referral hospital because15 patients were attending in the hospital per day and 20% from Sabasaba health centre because 5 patients were attending the services in a day. This made a proportion of 3:1.A total of 6 HCPs was selected purposively based on their working experience and interaction with diabetes patients in the provision of diabetes services at the facilities for at least two years. The KII respondents were nurses, nutritionists and doctors.

2.2.3 Data collection tools and procedure

Researchers visited outpatient diabetes clinic weekly on Thursday a day scheduled by the health facilities. Patients were approached while waiting for their consultation to introduce the study and seek their consent to participate. Prior to the actual data collection, a pilot survey to pre- test the questionnaire and in-depth interview guide was performed in a similar setting to assess the validity of the tools. Face to face interviews were done to collect information on socio-demographic characteristics of the patients and counseling services offered to T2DM which took an average of 45 minutes to complete. In addition, satisfaction with services offered was assessed using Diabetes Clinic Satisfaction Questionnaire (DCSQ) (Barendse *et al.,* 1999) and Diabetes Treatment Satisfaction Questionnaire (DTSQ) (Bradley, 1994). These questionnaires are validated and designed to measure satisfaction with a broad range of aspect of the services in a hospital-based diabetes clinic. The questionnaires were adapted and modified to elicit information on patients' satisfaction regarding the diabetes care services they receive, education on medication and lifestyle modifications. The overall level of satisfaction was calculated based on a 5-point Likert scale whereby 5 indicated very satisfied while 1 meant very dissatisfied (Brown, 2011). Then, very satisfied and satisfied were combined into one category as "satisfied," while neutral, dissatisfied, and very dissatisfied were merged as "dissatisfied". This is because neutrality might indicate indirect expression dissatisfaction. The satisfaction scoring for each question was set at a cut-off point of 3, indicating satisfaction. Key informant interviews were conducted among diabetes patients care providers from the two health facilities. Semi-structured interview guide was used to collect information on views of HCPs on diabetes care services which took an average of 30 minutes to complete. The interviews were audio recorded and supplemented by hand note taking to ensure comprehensive capturing of the data.

2.2.4 Statistical analysis

Quantitative data were entered, coded, and analysed using Statistical product and service solutions (SPSS) IBM for windows version 25. Descriptive statistics and appropriate significance tests were obtained such as means, frequency, percent, and standard deviations (SD). Univariate logistics regression was performed to determine strength of association between the dependent variable (satisfaction level) and independent variables (socio demographic and clinical characteristics). All variables that were significant at p-value of ≤0.1 in univariate analysis were selected for multivariate analysis to adjust the effect of confounders and backward stepwise procedure was used to ascertain the suitable variables whereas all variables with a p-value of ≤0.05 were retained in a final model. The qualitative data from KII were manually analysed using thematic analysis based on the objective of the study. Thematic analysis was accomplished by discovering the repeating themes in text and the findings were reported in textual narrations and quotations.

2.2.5 Ethical considerations

The aim, procedure and benefits of the study were explained and all T2DM patients who met the inclusion criteria were enrolled and signed an informed consent prior to the beginning of the study. The study was approved by National Health Research Committee of the National Institute for Medical Research (NIMR) with a reference number NIMR/HQ/R.8a/Vol.IX/4239. Permission to conduct this study was also sought from President Office Regional Authority and Local Government (PO-RALG), respective regional, district and health facility authorities. Anonymity and confidentiality of the information collected was assured to the respondents by using numbers instead of their names during data handling.

2.3 Results

2.3.1 Participants' characteristics

The results shown that the mean age of the respondents was 59±12 years; 65% (n=91) were females, 61% (n=85) were married, 62% (n=11) had primary level of education and only 7% (n=10) were employed in formal sectors. The mean duration of diabetes was 8 ±7 years and majority of the patients, (96.4% n=135) reported to spend more than one hour waiting to get health services (Table 2.1).

Table 2.1: Characteristics of the respondents

Variable	Frequency	Percent	Mean (SD)
Age	140		58.84±12.08
Sex			
Female	91	65	
Male	49	35	
Marital status			
Married	85	60.7	
Single (Separated/Divorced/Widowed)	55	39.3	
Education level			
No formal education	25	17.9	
Completed Primary school	87	62.1	
Completed Secondary level and above	28	30	
Occupation			
Formal employment	10	7.1	
Informal employment	130	92.9	
Duration of living with T2DM (years)	140		
Family history of diabetes			8.18±7.13
Yes	67	47.9	
No	73	52.1	
Waiting time to get services			
< 1 hour	5	3.6	3.58±1.511
≥1 hour	135	96.4	

2.3.2 Counseling services offered to T2DM patients

Majority of the participants (90.7%, n=127) received health education when first diagnosed with diabetes and about 29% (n=40) acknowledged the receipt of diabetes education on their routine visit to diabetes clinic. About 19% (n=27) had their weight assessed and were adviced on weight loss. Five respondents (3.6%) were never adviced on medication. Advice on healthy lifestyle was not compulsory where by about one in four respondents had never received counseling on either alcohol or tobacco use (Table 2.2).

Table 2.2: Counseling services offered to T2DM patients

Variable	Frequency	Percent
Health education when first diagnosed with diabetes		
Yes	127	90.7
No	13	9.3
Health education on routine diabetes clinic visit		
Always	40	28.6
Sometime	91	65.0
Never	9	6.4
Advice on current health and other disease conditions (complications)		
Always	46	32.9
Sometime	76	54.3
Never	18	12.9
Weight assessment and advice on weight loss		
Always	27	19.3
Sometime	83	59.3
Never	30	21.4
Lifestyle change plan		
Always	25	17.9
Sometime	55	39.3
Never	60	42.9
Advice on medication use and adherence		
Always	81	57.9
Sometime	54	38.6
Never	5	3.6
Advice on recommended healthy diet eating		
Always	71	50.7
Sometime	63	45.0
Never	6	4.3
Advice about other medications or use of herbals		
Always	11	7.9
Sometime	20	14.3
Never	109	77.9
Advice on how often to measure your blood sugar levels		
Always	62	10.0
Sometimes	64	45.7
Never	14	44.3
Advice on performance of physical exercise		
Always	46	32.9
Sometime	72	51.4
Never	22	15.7
Advice on limiting alcohol consumption		
Always	34	24.3
Sometime	70	50.0
Never	36	25.7
Advice on tobacco use		
Always	33	30.7
Sometime	64	45.7
Never	43	23.6

2.3.3 Barriers to effective counseling for T2DM patients

Interviews with providers of diabetes care revealed a number of barriers that affected services delivery. One of the identified barriers on the delivery of diabetes services was limited time for consultation and providers workload.

A large number of patients with diabetes are attending consultations in the same day, making it challenging to provide individual centered care due to the disproportionate ratio of HCPs to patients. This influence counseling on all risk behaviours and practices to be delivered at the same time due to limited time and provider workload (KII no. 3; Nurse at Sabasaba health centre)

"We have a shortage of HCPs especially doctors … very few doctors are available and those doctors are responsible for other duties in another department …. Making it difficult in delivery of effective counseling due to high workload" (KII no. 4; Nurse at Morogoro referral hospital)

Another barrier was on the working environment whereby in both hospitals, participants mentioned lack of private room for individual client counselling to be a limiting factor for effective counselling. Hence, nutritional education was therefore provided instead of one-to-one counseling *as insisted that;*

"Working environment in the two clinics are not conducive for counseling which might lead to ineffective counseling, because counseling needs a place where there is privacy to avoid contradiction and interruptions. Also, during the counseling or conversation, they might come up with very sensitive matters that require a confidential environment" (KII no. 1; Nutritionist at Morogoro regional referral hospital and KII no. 3; Nurse at Sabasaba health centre)

Participants consistently highlighted the strain caused by shortage of trained health care providers for diabetes resulting to increased workload and potentially leading to challenges in providing tailored care to patients as reported that;

"We are currently facing a challenge with our health providers who are specialized in counseling patients with diabetes. The majority of us provide counseling based on our personal experiences rather than relying on expert knowledge. Also, the HCPs in this facility lacked sufficient training and had fewer opportunities for refresher courses on diabetes" (KII no. 2; Nurse at Morogoro regional referral hospital)

Lack of clear guideline or protocol on management of patients with diabetes was also mentioned among the challenges. Participants highlighted a lack of uniformity in counseling approaches, with HCPs often adopting varied methods that might lead to inconsistent of information dissemination as reported that;

"We do not have specific guidelines and a training manual for counseling diabetes patients. We rely on the experience that we have on diabetes education" (KII no. 2; Nurse at Morogoro regional referral hospital)

2.3.4 Type 2 diabetes patients' satisfaction with the services offered

Results in table 2.3 shows that, the proportion of patients who were satisfied with the services was 48.6% (n=68) of which 91% (n=128) were dissatisfied with the amount of time spent at the waiting room. Regarding dietary advice provided, 41.4% (n=58) of respondents were dissatisfied and 68.6% (n=96) were satisfied with information regarding medication (including side effects). About 41% (n=57) were satisfied with education on physical activity, 62.1% (n=87), on smoking and 63% (n =88) on alcohol intake.

Table 2.3: **Satisfaction with the services offered to T2DM patients**

Variables	Dissatisfied		Satisfied	
	n	%	n	%
Total	72	51.4	68	48.6
The amount of time spent at waiting room	128	91.4	12	8.6
The amount of time spent during the consultation	79	56.4	61	43.6
Advice given regarding the current health and other disease conditions(complications)	82	58.6	58	41.6
Weight assessment and advice on weight loss	113	80.7	27	19.3
Advice given regarding medication use Including (side effects)	44	31.4	96	68.6
Advice regarding lifestyle change plan	102	72.9	38	27.1
Advice given on recommended healthy eating	58	41.4	82	58.6
Advice regarding performance of physical exercise	83	59.3	57	40.7
Advice given regarding limiting alcohol consumption	52	37.1	88	62.9
Advice given regarding cessation of smoking	53	37.9	87	62.1
Periodic physical examination for Diabetes complications	106	75.7	34	24.3
Satisfaction with the current treatment	93	66.4	47	33.6
Continuity of care that is whether or not you see the same doctor/nurse in each visit	119	85	21	15
Satisfaction with the overall hospital/Clinic visit	105	75	35	25

2.3.4 Factors associated with satisfaction on the services provided to T2DM patients

In multivariate logistic regression analysis, factors associated with satisfactions to the services offered were duration of living with diabetes (AOR 2.2, 95% CI: 1.1-4.4), marital status (AOR 2.1, 95% CI: 1.2-4.8), and waiting time to get services (AOR 0.76, 95% CI: 0.6-0.9) (Table 2.4).

Table 2.4: **Odds ratio of selected factors for satisfaction with the services among T2DM patients**

Variables	COR 95% CI	P-value	AOR 95% CI
Age	1.01(CI:0.99-1.047)	0.208	
Sex			
Female	1		
Male	1.31(CI:0.657-2.646)	0.436	
Marital status			
Single	1		1
Married	0.49(CI:0.25-0.998)	**0.049***	2.19 (CI:1.16-4.79)
Education level			
Primary school or lower	1		
Secondary school or higher	0.66(CI:0.293-1.491)	0.319	
Occupation			
Employed	1		
Unemployed	0.98(CI:0.435-2.232)	0.971	
Family history of T2DM			
No	1		
Yes	1.32(CI:0.682-2.578)	0.406	
Duration of T2DM	1.09(CI:1.032-1.158)	**0.003***	2.22 (CI:1.027-4.496)
Waiting time to get services	0.78(CI:0.618-0.986)	**0.038***	0.76 (CI:0.601-0.978)

Note: The abbreviation CI =confidence interval, (AOR=Adjusted Odds Ratio), (COR=Crude Odds Ratio), number 1 indicates reference in categorical variables

2.4 Discussion

The aim of this study was to examine the extent to which counseling services are provided to patients with T2DM and the level of satisfaction with the types of counseling provided. The study found that more than half of the respondents were dissatisfied with the services provided. The possible reason for dissatisfaction was the waiting time to receive services which was reported to be long in the studied areas. Additionally, it could possibly be explained by different level of expectations among patients or an actual lower level of perceived quality of services provided. The findings differ from what was reported in studies conducted in Mexico, China and Saudi Arabia which found that about 85%, 75% and 66% respectively were satisfied with the service provided (Yu *et al.,* 2022; Prado-Galbarro *et al.,* 2020; Al Anazi *et al.,* 2019). The difference may be attributed to variations in the study setting, population, methodology employed and variation in sample size. For instance, the study conducted in Mexico was a population-based National Health and Nutrition Survey which included patients with diabetes, hypertension, and/or dyslipidemia. The study done in China used self-reported non-standardized questionnaire to assess participants' satisfaction with the care that they received while the current study used a validated Diabetes Clinic Satisfaction Questionnaire (DCSQ) (Barendse *et al.,* 1999).

Regarding service-related factors, the majority of patients were not satisfied with the time spent in the waiting area which was reported to be long in the current study. This finding could be explained by shortage of adequately trained HCPs and heavy workload as reported in qualitative findings. This finding was similar to a study conducted by Munyogwa *et al.* (2020), in Mwanza Tanzania and in Malaysia by Shalihin *et al.* (2020), which reported that, majority of the T2DM patients were not satisfied with the amount of time spend during consultation which was little and in the waiting area which was much.

More than one third of the T2DM patients were dissatisfied with the advice regarding eating healthy diet, physical activity, tobacco use and alcohol consumption. This might be due to generic advice, which may not consider the patient's specific circumstances, preferences, or cultural factors, leading to dissatisfaction. Also, it was due to inadequate emphasis of HCPs on lifestyle behaviours, as reported in this study where about one in four respondents had never received counseling on either alcohol or tobacco use. Another reason might be related to the way counseling is given to patients. In most cases, patients are counselled on all risk behaviours and practices at the same time, making it difficult for the patients to comprehend and keep up with the information as reported by care providers in the current study. The findings are similar to a study conducted in Saudi Arabia which reported that, about 61% and 59% of the study population were dissatisfied with information regarding physical exercise and dietary advice respectively (Al Anazi *et al.,* 2019). This might be due to similarities of the standard tool used and methodology applied.

The present study indicated that advice on key issues such as physical activity, tobacco and alcohol use were not adequately provided to T2DM patients. This was attributed by limited number of adequately trained HCPs for diabetes health care services. It may also be due to limited resources within healthcare system such as specific educational materials for training and counseling, private space for conducting counseling as well as guidelines and protocol for diabetes management as reported by HCPs in the current study. Another study done in South west of Saudi Arabia support the current findings which reported limited receipt of lifestyle counseling services for patients with type 2 diabetes (Gosadi, 2021). In contrast, a study done by Kiestra *et al.* (2020), in Netherland revealed adequate receipt of lifestyle counseling, with tobacco use being the most adviced lifestyle habit and alcohol use being the least discussed during consultations. The discrepancies might probably be due to differences in HCP practices, time constraints and lack of standardized protocols for counselling as reported by the HCPs in qualitative findings in the current study.

According to the multivariate analysis, long duration of living with T2DM, being married and long waiting time to get services were strongly associated with satisfaction towards the counseling services. Patients with a longer duration of living with T2DM were familiar with hospital environment and care providers. They may also have more experience in managing their conditions which could lead to higher expectations for services than their counterparts. Another reason could be that longer-term patients might be more aware of their needs and preferences, making them more sensitive to the quality of services received. This finding was supported by a study done in Indonesia which found significant association between patients' satisfaction and the long duration of T2DM (Putra *et al.,* 2022).

Nevertheless, Short-term patients were more likely to be dissatisfied with the services than their counterparts, which might be due to uncertainty about their conditions, lack of familiarity with diabetes management and the sudden need to adapt to new routines which could negatively affect their perception on the services.

In this study, being married was associated with greater satisfaction with the services being offered. Generally, married individuals may have grater emotional support which can positively impact their overall experience and satisfaction with healthcare services. Additionally, married patients may have more reliable assistance in managing their condition, potentially leading to better outcomes and higher satisfaction. This finding was supported by studies in Iraq (Kadium, 2019), and Turkey (Baltaci *et al.,* 2013), that reported a significant association between marital status and patients' satisfaction. In spite of that, single patients might feel more isolated and experience higher levels of stress, which could negatively affect their perception to the services.

Furthermore, the time spent by patients while waiting to receive services was also an important factor that was found to influence patients' satisfaction with the services. Patients who had to wait for a long time to receive services were 24% less likely to be satisfied with the services compared to their counterparts. This can possibly be explained by prolonged waiting times that can led to frustration, anxiety and discomfort causing patients to have a negative perception of the quality of the care they receive as well as loosing attention to what was offered due to tiredness. Long waiting times can affect the patient's willingness to return to the clinic which can ultimately have an impact on continuity of care. The findings of this study align with a study conducted in Mexico, South Africa and Iran which revealed that service satisfaction was inversely related to waiting time (Prado-Galbarro *et al.,* 2020; Steyl *et al.,* 2020; Kadium, 2019). Nevertheless, patients who experience shorter waiting times perceive the hospital as efficient and respectful of their time, resulting in a more positive overall experience. Reduced waiting times can alleviate stress and anxiety, contributing to a more comfortable and less frustrating hospital visit. As a result, T2DM patients are more likely to have higher satisfaction with the services offered (Shalihin *et al.,* 2020).

2.5 Conclusion and Recommendations

This study revealed moderate counseling practices and services satisfaction among type 2 diabetes patients. Diabetes services were mostly limited to large patient-load and shortages of trained HCPs, private space and time for counselling, lack of guidelines and protocol for counseling. A long duration of living with T2DM and being married were positively associated with patients' satisfaction with the services, while waiting time was inversely related with services satisfaction. Therefore, Ministry of health and other stakeholders should ensure that clear protocol and guideline are formulated and established for diabetes prevention and management. They should also ensure integration of the recommended practices into existing healthcare systems so that they become a routine part of care to enhance self-care.

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Authors' contribution

HB conceived the idea, developed proposal, designed the study, participated in data collection, data management, analysis and interpretation of the results, and drafted the manuscript. AWM, and SSM assisted in the design and in the proposal development, supervised the study procedures, and revised subsequent drafts of the manuscript. All authors read and approved the final manuscript.

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CHAPTER THREE

MANUSCRIPT TWO

Compliance to Recommended Prevention and Management Practices among Type 2 Diabetes Patients in Morogoro Municipality, Tanzania. [2]

*Hasna R Bofu[1], Safiness Simon Msollo[1] and Akwilina Wendelin Mwanri[1]

[1] Department of Human Nutrition and Consumer Sciences, Sokoine University of Agriculture, Po. Box 3006, Chuo Kikuu, Morogoro-Tanzania.

*****Corresponding author: hasnabofu@gmail.com

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Compliance to Recommended Prevention and Management Practices among Type 2 Diabetes Patients in Morogoro Municipality, Tanzania

Hasna Bofu[1], Safiness Simon Msollo[1] and Akwilina Wendelin Mwanri[1]

[1] *Department of Human Nutrition and Consumer Sciences, Sokoine University of Agriculture, Po. Box 3006, Chuo Kikuu, Morogoro-Tanzania.*

Abstract

Introduction: Diabetes-related complications are the significant causes of morbidity and mortality among type 2 diabetes patients. The complications can be reduced by practising and maintaining several preventive measures. The present study aimed to assess compliance and factors associated with recommended management practices and prevention of complications among type 2 diabetes patients in selected health facilities in Morogoro Municipality, Tanzania.

Methods: A hospital-based cross-sectional study was conducted from February to May 2023 among 140 patients diagnosed with diabetes for at least three months before the study. Data were collected through face-to-face interviews using a structured questionnaire, which included patients' characteristics and a previously validated Summary of Diabetes Self-care Activities questionnaire to assess patients' compliance with recommended practices. A multivariable regression analysis was employed to identify factors associated with compliance with recommended practices.

Results: The mean age of the respondents was 59 ±12.08 years and 65% were females. Among 140 patients, 91.4% (n=128) had poor or unsatisfactory self-care practices with an overall mean of 3.81± 2.08 days per week for diabetes management. The recommended practices with good or satisfactory performance were non-smoking, non-alcohol drinking and prescribed medication. In contrast, unsatisfactory performance was observed for self-monitoring blood glucose and physical activities. Multiple regression analysis showed that co-morbidity (AOR 4.5; 95% CI: 1.14-18.02) and being employed (AOR 4.4; 95% CI: 1.25-15.44) independently predict self-care practices.

Conclusion and recommendation: Compliance with self-monitoring of blood glucose, physical exercise and dietary practices were found to be low among type 2 diabetes patients, which could increase the risk of complications. Nutritional and lifestyle counselling and the use of peer groups should be emphasized to improve compliance with recommended practices.

Keywords: Type 2 diabetes, compliance, prevention and management practices, Tanzania.

Introduction

Globally, type 2 diabetes mellitus (T2DM) is considered one of the major public health epidemics, with a considerable number of premature deaths, disabilities, and high morbidity and mortality rates (Khan *et al.*, 2020). The prevalence has been on the increase mainly due to the increasing prevalence of risk factors such as sedentary lifestyles and unhealthy eating habits resulting in overweight and obesity (Motala *et al.*, 2022). Tanzania is one of the top five Sub-Saharan African (SSA) countries where the high prevalence of T2DM has a significant effect (IDF, 2021). The International Diabetes Federation [IDF] (2021) reported that more than two million Tanzanian adults have diabetes, primarily found in urban areas.

[1] ***Corresponding author:** hasnabofu@gmail.com

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Complications of T2DM can be costly due to its chronic nature and multi-organ involvement which can cause damage to small blood vessels (micro-vascular) such as kidney diseases (nephropathy), eye damage (retinopathy) and nerve damage (neuropathy) and macro-vascular such as blood vessels which lead to heart attack, stroke, or leg amputation (WHO, 2019). People with diabetes are at risk of mental health, such as anxiety, that can result from the stress of managing their conditions (Kalra *et al.*, 2018). Furthermore, it tends to affect individual functional capacities and quality of life, leading to significant morbidity and premature mortality. This is associated with an economic burden to the patients, families, and national and health systems because of the frequent visits to the healthcare care providers and admission to health facilities (Riddle & Herman, 2018).

Even though diabetes can have several impacts on health, its early detection and adherence to a healthy lifestyle change can positively impact the course of the disease (American Diabetes Association [ADA], 2018). Secondary prevention aims to reduce disease impacts on those who already have diabetes or prevent the development of long-term complications (Bali *et al.*, 2018). The complications of the disease can be reduced by several preventive measures including maintaining body weight, limiting alcohol consumption, smoking cessation, and preventive medications (Alouki *et al.*, 2016). In addition, effective management of T2DM requires the patients to learn and practice healthy self-care and lifestyle behaviours like blood glucose monitoring, taking medications, diet and exercise, proper counselling and compliance to these self-care practices and healthy lifestyle behaviour to control blood glucose levels and other complications associated with diabetes (Aschner, 2017).

Numerous studies that assessed compliance and adherence to recommended practices reported varied results. The study done in Saudi Arabia reported that adherence to self-care activities, including diet, exercise, blood glucose monitoring and foot care, was relatively poor. However, medication intake was strictly followed (Alhaiti *et al.*, 2020). A study done by Bonger and Tariku (2018), revealed that the extent to which individuals adhere to the recommended management of T2DM is substantially low whereby about 80% of diabetes patients did not adhere to the recommended diet management and self-monitoring of blood glucose level, while a majority (96%) of the respondents adhere to the prescribed medications. A study done by Rijal *et al.* (2022), to assess compliance of diabetes patients to diet and exercise revealed that compliance on diet was reasonable compared to exercise aspects. Several studies indicated that demographic and socioeconomic, clinical, and health-related characteristics such as age, religion, employment status, sex, family support, duration of T2DM, presence of comorbidities and diabetes-related complications influence compliance to recommended management practices (Ayele *et al.*, 2018; Zarei *et al.*, 2022; Zewdie *et al.*, 2022).

In Tanzania, most studies on T2DM have focused on prevalence and risk factors, diabetes-related complications, knowledge, and awareness (Chiwanga *et al.*, 2016; Stanifer *et al.*, 2016; Damian *et al.*, 2017). However, more information is needed about compliance with recommended prevention and management practices (Rwegerera, 2014; Mwanri *et al.*, 2018). Thus, this study assessed compliance with the recommended management practice and identified factors associated with compliance among T2DM patients. The results will help plan interventions targeting secondary prevention among T2DM patients to improve their quality of life and reduce the burden on the health system.

Methodology

Study area, design, and population.

The cross-sectional study was carried out in urban areas of the Morogoro region between February and May 2023. Morogoro municipality was selected purposively due to limited information on diabetes and being a fast-growing area as it is a central connection to the Southern Highlands and central and

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Lake zones. This study included patients diagnosed with T2DM within three months or more and receiving healthcare services in selected diabetes clinics. Type 2 diabetes patients who had hearing or speech problems and those who were critically ill to respond to the questions were excluded from the study.

Sample size and sampling procedures.

A sample was estimated using the formula adopted from Kothari (2004). Based on the prevalence of T2DM in Tanzania (STEP-SURVEY) of 9.1% (Mayige & Kagaruki, 2013), the standard normal distribution of 95% and absolute error of 5% were used to obtain the sample size of 127 T2DM and after adjusting the non-response rate of 10% the total sample size was 140. The two health facilities with diabetes clinics, Sabasaba Health Center, and Morogoro Regional Referral Hospital, were purposively selected to involve public health facilities with diabetes clinics and accommodate most patients. About 15 patients attended the diabetes clinic per day at Morogoro Regional Referral Hospital and about five patients at Sabasaba Health Center. Based on this, a simple random sampling technique was used to select participants from the register list. About 15 patients from the two hospitals who met inclusion criteria and consented to participate were interviewed daily. A proportionate sampling technique was applied to acquire a total sample of 140 T2DM patients in two hospitals. About 80% of the T2DM patients were selected from Morogoro Regional Referral Hospital and 20% from Sabasaba Health Center.

Data collection tool and procedure

Researchers visited the outpatient diabetes clinic weekly on Thursday. Patients were approached to introduce the study to them and seek their consent to participate while they waited for their consultation. Data were collected using a structured questionnaire, which took an average of 45 minutes to complete. Face-to-face interviews were done to collect information on the respondents' sociodemographic details, clinical characteristics, and a Summary of Diabetes Self-Care Activities (SDSCA) questionnaire (Toobert *et al.*, 2000). This questionnaire was adapted and modified to elicit information on patients' frequency to comply with recommended prevention and management practices. The questionnaire consisted of items on the general diet, specific diet, physical activity, blood-glucose testing, foot care and items for smoking. Also, items concerning alcohol consumption and medication were added to capture all recommended practices for the prevention and management of T2DM.

Each item in SDSCA asks the respondents to mark the number of days the patients performed and adhered to the indicated self-care behaviour related to diabetes care within the last week on an eight-point scale ranging from (0-7), with 0 being the least desirable. Therefore, to maintain this standardization in results interpretation, one item of the specific diet dimension, which asks about intake of fat-rich foods, had their score inverted (7=0, 6=1, 5=2, 4=3, 3=4, 2=5, 1=6, 0=7) and vice versa as recommended by the revised SDSCA. The overall mean score of adherence was generated for each item of recommended practices by summating the mean score for self-care practices of all items and dividing it by the sum of some questions on each scale of the items. Final classification was done as having satisfactory or good self-care practices if the score was above or equal to 5 and poor or unsatisfactory for scores below 5.

Statistical analysis

The Statistical Package for Social Science IBM (SPSS) for Windows version 25 was used for data analysis. Descriptive statistics such as means, and standard deviation (SD) were used for numerical or continuous variables to describe self-care practices. Univariate logistics regression (analysis of a single

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variable) was used to determine the strength of association between the dependent (self-care practices) and independent variables (socio-demographic and clinical characteristics). All variables that were significant at a p-value of ≤0.05 in univariate analysis were selected for multivariate analysis (analysis of multiple variables) to adjust the effect of confounders. A backward stepwise procedure was used to ascertain the suitable variables whereby all variables with a p-value of ≤0.05 were retained in a model. Both crude odds ratio (COR) and adjusted odds ratio (AOR) with 95% CI were reported.

Ethical approval

The study commenced upon ethical approval from the National Health Research Committee of the National Institute for Medical Research (NatHREC) with a reference number NIMR/HQ/R.8a/Vol.IX/4239. Also, permission to conduct this study was obtained from the President's Office of Regional Authority and Local Government (PORALG) and respective regional, district and health facility authorities. The aim, procedures, benefits and possible risks of the study were explained and all participants who agreed to participate in this study and met the eligibility criteria were enrolled. Informed written consent was sought from the respondents to ensure voluntary participation in the study. The participants were assured of confidentiality and anonymity concerning the collected information by using numbers to represent patients' names during data handling.

Results

Socio-demographic characteristics of the respondents

The mean age of respondents was 59 years; 65% (n=91) were females, 60.7% (n=85) were married, 7.9% (n=11) had college or university education, and only 7.9% (n=11) were employed in the formal sector. The mean duration of diabetes was 8 ±7.13 years. About half of the respondents, 48% (n=67), had a family history of diabetes, and 42% (n=59) had comorbidities. Out of those with comorbidities, 35.7% (n=50) were hypertensive. About 66% (n=92) of respondents had diabetes-related complications. Of those with complications, 22.9 % (n=32) had retinopathy (Table 1).

Table: Socio-demographic and clinical characteristics of the respondents

Variable	Frequency	Per cent	Mean (SD)
Age			58.84±12.08
18-49 years	35	25	
>50 years	105	75	
Sex			
Male	49	35	
Female	91	65	
Marital status			
Married	85	60.7	
Single (Separated/Divorced/Widowed)	55	39.3	
Education level			
No formal schooling	9	6.4	
Not completed primary school	16	11.4	
Primary school completed	85	60.7	
Not completed secondary school	2	1.4	
Completed secondary school	17	12.1	
College/university	11	7.9	
Source of income			
Formal employment	10	7.1	
Self-employed	44	31.4	

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Retired officer	19	13.6	
Unemployed	52	37.1	
Farmer	15	10.7	
Duration of T2DM	140		8.18±7.13
Family history of diabetes			
Yes	67	47.9	
No	73	52.1	
Presence of co-morbidity (Chronic disease)			
Yes	59	42.1	
No	81	57.9	
Type of comorbidity			
Hypertension	50	35.7	
Heart disease	6	4.3	
Cancer	3	2.1	
Presence of diabetes-related complications			
Yes	92	65.7	
No	48	34.3	
Type of complications			
Retinopathy	32	22.9	
Hypertension	29	20.7	
Nephropathy	1	0.7	
Stroke	2	1.4	
Lower extremities amputation	6	4.3	
Retinopathy, Hypertension	14	10	
Hypertension, lower extremities amputation	2	1.4	
Lower extremities amputation and retinopathy	6	4.3	

Frequency of Adherence to Recommended Practices

Table 2 presents the mean number of days participants performed self-care practices for the last seven days. Most participants (91.4%, n=128) reported poor compliance with an overall mean score of 3.81 ± 2.08 days. Only 8.6% of respondents (n=12) reported good compliance. The most performed self-care practice was non-smoking, where almost all respondents (98.6%, n=138) had never smoked, 95% (n=133) of participants had never taken a drink containing alcohol, and the least was self-monitoring of blood glucose with a mean of 2.22±2.05 days per week. About 22% (n=31) of respondents perform physical activities with a mean of 3.04 days per week in five days or more.

Table 2: Frequency of Adherence to Recommended Practices

Self-care behaviour	Poor < 5 days n (%)	Good ≥ 5 days n (%)	Mean (SD)
Diet	**93 (66.4)**	**(47 (33.6)**	**4.44 (1.81)**
General diet			**4.33 (1.67)**
Follows a healthful eating plan	87 (62.1)	53 (37.8)	4.31 (1.62)
Follows eating plan	79 (56.4)	61 (43.6)	4.36 (1.72)
Specific diet			**4.55 (1.95)**
Eat five or more servings of fruits and vegetables.	74 (52.9)	66 (47.1)	4.42 (1.95)

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Eats high-fat foods (red meat or full-fat dairy products)	60 (42.9)	80 (57.1)	4.68 (1.96)
Exercise	**109 (77.9)**	**31(22.1)**	**3.04 (2.44)**
Participate in at least 30 minutes of physical activity	85 (60.7)	55 (39.3)	3.79 (2.41)
Participate in specific exercise sessions	106 (75.7)	34 (24.3)	2.29 (2.47)
Self-monitoring of blood glucose	**121 (86.4)**	**19 (13.6)**	**2.22 (2.05)**
Tests blood sugar level	107 (76.4)	33 (23.6)	2.51 (2.09)
Tests blood sugar the number of times recommended by health care provider	121 (86.4)	19 (13.6)	1.94 (2.0)
Foot Care	**88 (62.9)**	**52 (37.1)**	**3.78 (2.41)**
Checks feet	84 (60)	56 (40)	3.83 (2.37)
Inspect inside of the shoes.	82 (58.6)	58 (41.4)	3.74 (2.45)
Medication Took the prescribed medication	**15 (10.7)**	**125 (89.3)**	**6.09 (1.83)**
Total Mean	**128 (91.4)**	**12 (8.6)**	**3.81 (2.08)**
	Yes n (%)	**No n (%)**	
Smoking	2 (1.4)	138 (98.6)	
Alcohol	7 (5.0)	133 (95)	

Factors associated with compliance to recommended practices among Type 2 Diabetes Patients
Univariate analysis revealed that age, sex, education level, family history of diabetes and duration of diabetes were not significantly related to self-care practices and, therefore, were removed from the model. The selected factors, the primary source of income, co-morbidity, and complications, were analysed using multiple logistic regression with a stepwise backward selection procedure to determine their association with self-care practices. A significant association was observed in the presence of co-morbidity (AOR 4.5, 95% CI: 1.14-18.02) and primary source of income (employed patients) (AOR 4.4, 95% CI: 1.25-15.44) (Table 3).

Table 3: Odds ratio of select factors for recommended practices among T2DM Patients

Variables	Good self-care practices		Poor self-care practice		COR (95% CI)	P value
	n	%	n	%		
Age (Years)					0.98 (0.94-1.036)	0.581
Sex						
Male	6	4.3	43	30.7	1	0.262
Female	6	4.3	85	60.7	0.506 (0.154-1.662)	

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Education level						
Primary or lower	8	5.7	104	74.3	1	0.3
Secondary or higher	4	2.9	24	17.1	0.51 (0.142-1.825)	
Main source of income	6	4.3	23	16.4	4.56 (1.35-15.436)	**0.015***
Employed	6	4.3	105	7.5	1	
Unemployed						
Family history of T2DM	5	3.6	62	44.3	0.76 (0.229-2.522)	0.654
Yes	7	5.0	66		1	
No				47.1		
						0.727
Duration of T2DM					0.98 (0.899-1.077)	
Presence of co-morbidity						
No	3	2.1	78	55.7	1	
Yes	9	6.4	50	35.7	4.68 (1.208-18.126)	**0.025***
Presence of complications						
No	8	5.7	41	29.3	1	
Yes	4	2.9	87	62.1	0.236 (0.067-0.828)	**0.024***
		Multivariate analysis			**AOR (95% CI)**	
Presence of co-morbidity						
No	3	2.1	78	55.7	1	
Yes	9	6.4	50	35.7	4.5 (1.14-18.02)	**0.032***
Main source of income						
Employed	6	4.3	23	16.4	4.4 (1.25-15.44)	**0.021***
Unemployed	6	4.3	105	7.5	1	

Note: The abbreviation 95% CI =confidence interval, AOR=Adjusted odds ratio, COR =Crude odds ratio number 1 indicates reference in categorical variables at *significance at p<0.05; multivariate analysis also includes the presence of complications with no significant association.

Discussion

The present study aimed to determine the compliance of T2DM patients to recommended prevention and management practices in Morogoro municipality, Tanzania. The study results indicated that most patients performed poorly on recommended practices. This finding can be explained by the low level of education among study participants, as most of them had a primary level of education. It might also be due to a need for more health education regarding recommended self-care practices.

In Tanzania, there needs to be more information on adherence to self-care practices and the factors associated; however, the study done in Brazil supports the current findings that most respondents had poor adherence to self-care practices (Macedo *et al.*, 2022). This could be due to similarities between the standard tool and methodology. The findings of the current study are higher than those of the study conducted in Addis Ababa by Gemeda & Woldemariam, (2022) (52%) and in Northern Ethiopia (49.7%) (Zewdie *et al.*, 2022). The possible reason for this discrepancy could be the differences in methodology, study design, socio-economic and cultural factors, and variation in sample

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size across the study. It might also be related to using different numbers of items in SDSCA to assess self-care practices.

In all diabetes domains, self-care practices, such as self-monitoring blood glucose (SMBG) and physical exercise, were the least practiced. Similar results have been reported in other hospital-based studies conducted in Ethiopia (Dedefo *et al.*, 2019; Katema *et al.*, 2020; Jemal *et al.*, 2022). The poor performance of SMBG practices is probably related to socio-economic variation. Some patients could not afford to undergo a checkup at a nearby health facility every day as recommended by healthcare providers or to purchase glucometer and strips for self-blood glucose tests. It might as well be related to discomfort from frequent finger pricking. Contrasting results have been shown by other studies with a very high rate of adhering to regular SMBG compared to other practices, for example, the study done by Al-Ozairi et *al.* (2023) in Arab population and a systematic review conducted by Paudel *et al.* (2022). The variation in knowledge and awareness of the importance of understanding the glycemic status, which helps to adopt appropriate action to cope with the glycemic status, may also explain the observed differences (Mercado, 2019).

In the current study, only 22% of participants adhered to physical activities, which is a higher rate than the findings from a study in South Africa. In contrast, only 9% reported good adherence to physical activity practices (Mutyambizi *et al.*, 2022). The possible reason for relatively low adherence to physical activities could be the presence of comorbidities or diabetes-related complications, which were relatively high in our study. A much better physical activity behaviour was reported in a study from Nepal (90%) (Adhikari & Baral, 2021) and (88%) from a study in Vietnam (Van Loi *et al.*, 2023). This variation may be due to methodological differences, and the tools used in the South African study are the Global Physical Activity Questionnaire (GPAQ) to assess adherence to physical activity.

Regarding recommended moderation of alcohol consumption and cessation of smoking, very few respondents reported having smoked or drunk alcohol in the previous week. The low rate of smoking status and alcohol consumption in the current study were attributed to the fact that after being diagnosed with T2DM, the individuals quit smoking and abstained from alcohol use to prevent the occurrence of diabetes-related complications (Wu et al., 2021; Campagna, 2019). Contrary to the current findings, higher rates of smoking and alcohol status were observed in a systematic review conducted by Paudel et al. (2022) and a study from China (Hu *et al.*, 2022). Approximately, 95% of the respondents in the current study abstained from alcohol consumption. This finding is similar to a study at public healthcare facilities in Gauteng, South Africa, which found that 99% of T2DM patients abstained from alcohol consumption (Mutyambizi *et al.*, 2020).

Only one-third of respondents adhered to diet management practices regarding the diet dimension. It is always difficult to change established eating habits and social influence. This finding is consistent with a study in India which reported that 35.2% of participants had a satisfactory performance on dietary behaviours (Karthik *et al.*, 2020). The current study's findings are lower than those conducted in Ethiopia and South Africa, revealing that more than two-thirds of participants had good dietary practices (Gemeda & Woldemariam, 2022; Mutyambizi et *al.*, 2020). This discrepancy might be attributed to the differences in eating habits, availability of food options, socioeconomics and cultural factors, study population, and the study tool used as other studies used Diabetes Self-Management Questionnaire (DSMQ), 24-hour food recall and Dietary Diversity Score (DDS) whereas our study used SDSCA.

Considering the medication dimension, most patients behaved well when taking diabetes medications (insulin or pills) as recommended. The reason for higher compliance to medication could be a fear of worsening health conditions among patients with comorbidities and diabetes-related complications, which motivated them to adhere to their medication regimen. Another reason could be that patients might have perceived medication as more critical than other recommended ways to

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control diabetes (Lim *et al.*, 2022). The findings of the current study are almost comparable to studies done in Ghana (84.5%) by Afaya *et al.* (2020), Ethiopia (82.3%) by Zewdie *et al.* (2022), India (81.6%) by Syed et *al.* (2022). This could be due to similarities between the standard tool and methodology.

According to the multivariate analysis, co-morbidities and being employed were strongly associated with compliance with recommended prevention and management practices. A possible reason for high compliance among those with comorbidities might be that other co-morbidities and their multiple burdens may encourage patients to improve their practices based on the recommendations. Also, it might be due to frequent visits to healthcare facilities, continued counselling and health education; hence, they tend to pay more attention to their health condition. This finding was supported by studies in Kakamega County, Kenya (Mbunya, 2022) and Adama town, Ethiopia (Gemeda & Woldemariam, 2022), which reported that the odds of being adherent to recommended practices were higher among patients with comorbidities. Nevertheless, patients with no comorbidities were less likely to adhere to the recommended practices than their counterparts because they might need to pay more attention to the importance of self-care practices. After all, they have not experienced the burden of managing multiple health conditions.

Furthermore, unemployment was also an essential factor affecting compliance with recommended prevention and management practices. This might be due to financial difficulties limiting a person's ability to engage in self-care practices such as healthy eating and medication. Also, unemployment can have a significant impact on mental health challenges such as stress and anxiety, which can make it difficult to prioritize self-care practices. A job can provide financial stability, improving access to healthcare services and diabetes management resources. Consistent with a study done in Addis Ababa, Ethiopia (Wolderufael & Dereje, 2021) and Debre Markos, Ethiopia (Bayable et al., 2022), the present study revealed that being employed was four times more likely to practice self-care practice compared to their counterparts.

Conclusion and Recommendations

The overall compliance rate with recommended prevention and management practices among T2DM patients was low, with self-monitoring of blood glucose, physical exercise, and dietary practices being the least performed, which could increase the risk of complications. Having diabetes-related comorbidities and being employed were significant variables associated with compliance with recommended prevention and management practices. Therefore, nutritional and lifestyle counselling and the use of peer groups should be emphasized to improve compliance with recommended practices.

Strengths and Limitations of the Study

The major strength of this study is the use of standardized tools to measure frequency to comply with recommended practices, which allowed the findings to be comparable with previous studies. The main limitations of this study were the small sample size and the use of a self-report method to evaluate patients' compliance with recommended practices, which could have resulted in overestimation or underestimation of the level of compliance. The other limitation was that many variables had tiny observations during analysis, which caused low precision. Further research should incorporate qualitative methods to understand better patients' perspectives and experiences on adherence to recommended practices and explore contextual factors influencing compliance to recommended practices.

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Conflicts of Interest
The authors declared no conflicts of interest.

Authors contribution
HB conceived the idea, developed the proposal, designed the study, participated in data collection, management, analysis and interpretation of the results, and drafted the manuscript. AWM and SSM assisted in the design and the proposal development, supervised the study procedures, and revised subsequent manuscript drafts. All authors read and approved the final version of the manuscript.

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CHAPTER FOUR

4.0 GENERAL DISCUSSION

This study has two general aims which were to evaluate counseling practices, barriers to effective counseling and services satisfaction among type 2 diabetes patients for prevention and management of the disease related complications. It also dealt with determining compliance of the T2DM patients to recommended prevention and management practices in Morogoro municipality, Tanzania. The study reported that more than half of the respondents were dissatisfied with the services being offered. The possible reasons for dissatisfaction were attributed by long waiting time and lack of personalized care plans tailored to individual needs. The findings of this study differ from what was reported in other studies conducted in Iraq and South Africa (Steyl *et al.,* 2020; Kadium *et al.,* 2019) which reported that majority of the patients were satisfied with the services being offered.

The study found that advice on crucial aspects on management of T2DM such as physical activity, tobacco, and alcohol use was insufficient. This was attributed by lack of counseling guidelines and protocols, as well as the reported constraints of time and private space for conducting counseling by healthcare providers in the study. A study conducted in the southwest region of Saudi Arabia also highlighted the limited provision of lifestyle counseling services for T2DM (Gosadi, 2021). In contrast, a study conducted by Kiestra *et al.* (2020) in Netherlands revealed that lifestyle counseling was adequately provided, with tobacco use being the most addressed lifestyle habit and alcohol use being the least discussed during consultations.

The study revealed that, a long duration of living with T2DM was strongly associated with satisfaction towards the services offered. It’s possible that over the time, patients have developed a better understanding of their needs and preferences, allowing healthcare providers to tailor services accordingly. Additionally, patients with a longer duration of living with T2DM may have established stronger and trusting relationships with care providers, fostering a sense of satisfaction. This finding is in line with a study conducted in Indonesia which revealed a significant association between patients' satisfaction and the long duration of T2DM (Putra *et al.,* 2022). Another reason could be that increased experience with managing diabetes could lead to a greater appreciation for the support and services provided.

On the other hand, the married individuals were two times more likely to be satisfied with the services than their counterparts. This might be due to the reason that married individuals may have greater emotional support, shared responsibilities, and a sense of companionship which may positively influence their overall wellbeing, adherence to treatment plans, coping with the challenges and satisfaction with healthcare services. The findings are in line with the studies conducted in Iraq (Kadium *et al.,* 2019) and Turkey (Baltaci *et al.,* 2013) which reported significant association between patients' satisfaction and marital status.

Furthermore, patients who had to wait for a long time to get services were less likely to be satisfied with the services offered compared to their counterparts. Extended waiting time in healthcare services often lead to lower patient satisfaction which may include an increase in anxiety and discomfort, perceived inefficiency in the healthcare system, disruptions to personal schedules and a sense of unmet expectations. The findings of this study are consistency with a study conducted in Mexico and South Africa which reported that service satisfaction was inversely related to waiting time (Prado-Galbarro *et al.,* 2020; Steyl *et al.,* 2020).

Additionally, the results of the current study indicated that majority of the T2DM patients had poor performance on recommended practices. These results may be attributed to factors such as limited access to healthcare, inadequate diabetes education, and socio-economic challenges. The current study found low rate of compliance to recommended management practices than those of the study conducted in Debre Markos, Ethiopia by Bayable *et al.* (2022) and in Eastern Uganda (Kiruyi *et al.,* 2023).

Also, the present study found a significant association between patients with comorbidities and good performance of recommended management practices. Patients with comorbidities may be more aware of their health status, making them to prioritize self-care practices. Additionally, healthcare professionals might emphasize the importance of self-care for those with multiple health conditions, encouraging proactive management. These findings appeared to contradict the findings of the study in Ethiopia and Nepal which reported that patients with comorbidity have poorer diabetes self-care practices than those without comorbidity (Adhikari & Baral, 2021; Gode *et al.,* 2021). Nevertheless, patients without comorbidities might perceive a lower burden of overall health conditions, leading to decreased motivation for lifestyle modifications and adherence to treatment plans.

Furthermore, patients who were employed were four times more likely to practice good self-care than those who were unemployed. This can possibly be explained by the fact that unemployment limit an access to healthcare services as a result of financial constraints which limit resources for medications or access to healthy food, and stresses that are related to lack of employment. This finding is consistent with a study conducted in the rural area of Kancheepuram district, India, which reported that individuals in the low socio-economic class were at an increased risk of poor self-care practices compared to their counterparts (Karthik *et al.,* 2020). In spite of that, individuals who are employed may often have an access to education and diverse social interactions contributing to a higher likelihood of getting information on their conditions management leading to, adhering to the recommended practices.

CHAPTER FIVE

5.0 GENERAL CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In conclusion, this study provides important insights into satisfaction to the counseling practices and services as well as compliance with recommended prevention and management practices among T2DM patients in selected health facilities in Morogoro Municipality. The study found that, satisfaction with counseling practices and services was moderate among T2DM patients. A long duration of diabetes and being married were strongly associated with service satisfaction while waiting time was inversely related to services satisfaction. Additionally, diabetes services were mostly limited to large patient-load and shortages of trained healthcare providers, private space and time for counseling as well as lack of guidelines and protocol for conducting counseling. Furthermore, majority of the participants had poor compliance to recommended prevention and management practices. Good adherence to recommended prevention and management practices was observed, particularly among patients with comorbidities and those who were employed.

5.2 Recommendations

i. Ministry of health and other stakeholders should ensure development of culturally appropriate educational materials that explain the importance of diabetes management, lifestyle changes, medication adherence, and potential complications. This can empower patients to take charge of their health.
ii. The government, through the Ministry of Health and other stakeholders, should ensure the formulation and establishment of clear guidelines and protocols specifically for diabetes mellitus in various healthcare practices. Also, it should ensure implementation of recommended practices effectively.
iii. Healthcare facilities should establish and integrate personalized counseling sessions to individual patient needs, while considering their cultural beliefs, literacy levels, and

socio-economic status. Personalized approaches can enhance patients’ engagement and understanding of the recommended prevention and management practices.

iv. Healthcare facilities should ensure strengthening and provision of in-service training and capacity building programs for healthcare professionals to improve their counseling skills specific on diabetes management.

v. Healthcare providers should integrate the recommended practices into existing healthcare systems to ensure that they become a routine part of care.

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APPENDICES

Appendix 1: Questionnaire

Questionnaire on satisfaction and compliance to management practices among type 2 diabetes patients in Morogoro municipality, Tanzania

GENERAL PERSONAL INFORMATION	**Fills blanks/tick where appropriate**
Interviewers name	
Centre name	1. Morogoro regional referral hospital 2. Sabasaba health centre
Name of respondent	
Respondent contact	
Date of interview	
SOCIO-DEMOGRAPHIC INFORMATION	
Age of respondent	…………. (years)
Sex of respondent	1. Male 2. Female
Marital status	1. Married 2. not married 3. Separated 4. Divorced 5. Widow 6. Cohabitating
What is the highest level of education you have attained?	1. No formal schooling 2. Not completed primary school 3. Primary school completed 4. Not completed secondary school 5. Secondary school completed 6. College/University

What is your main source of income?	1. Formal employment 2. Self employed 3. Retired officer 4. Unemployed 5. Farmer 6. Others, mention……………….		
For how long have you lived with diabetes	Years………………...or Months………….		
Do you have family history of diabetes?	1. Yes 2. No		
Do you have any other chronic diseases (comorbidity)? If yes mention	1. Yes 2. No		
Do you have any complications associated with diabetes? If yes mention			
How much time do you usually spend in the hospital per visit?	………………….		
How long did it take to arrive to the hospital from your home?	……………………		
COUNSELING SERVICES OFFERED TO T2DM			
Types of counselling services received How often the health facility does provide you with the following services?	**Ratings by respondents**		
	Always (3)	**Sometimes (2)**	**Never (1)**
1. Advice on current health and other disease conditions (complications)			
2. Health education when first diagnosed with diabetes			
3. Health education on routine diabetes clinic visit			
4. Weight assessment and advice on weight loss			
5. Lifestyle change plan			

6. Advice on medication use and adherence			
7. Advice on recommended healthy diet eating			
8. Advice about other medications or use of herbals			
9. Advice on how often to measure your blood sugar levels			
10. Advice on your blood sugar level target value			
11. Advice on interpretation of blood sugar target value and lifestyle modification based on blood sugar level reading. If not meeting the target what to do?			
12. Advice on performance of physical exercise			
13. Advice on limiting alcohol consumption			
14. Advice on cessation of smoking			

SATISFACTION OF THE T2DM PATIENTS WITH THE COUNSELING SERVICES

Services provided by the hospital. Are you satisfied with?	Rating by respondents				
	Very satisfied (5)	Satisfied (4)	Neutral (3)	Dissatisfied (2)	Very dissatisfied (1)
1. The amount of time spent at waiting room					
2. The amount of time spent during the consultation					
3. Advice given regarding the current health and other disease					

conditions(complications)					
4. Weight assessment and advice on weight loss					
5. Advice given regarding medication including (side effects)					
6. Advice regarding lifestyle change plan					
7. Advice given on recommended healthy diet eating					
8. Advice regarding performance of physical exercise					
9. Advice given regarding limiting alcohol consumption					
10. Advice given regarding cessation of smoking					
11. Periodic physical examination for Diabetes complications					
12. Satisfaction with the current treatment					

13.Continuity of care that is whether or not you see the same doctor/nurse in each visit					
14. Satisfaction with the overall hospital/Clinic visit					

COMPLIANCE TO RECOMMEND PREVENTIONS AND MANAGEMENT PRACTICES AMONG T2DM PATIENTS

SUMMARY OF DIABETES SELF-CARE ACTIVITIES (SDCSA)

Domain/Item	**Number of days**							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Diet								
General diet 1. How many days of the last 7 days have you followed a healthful eating plan?								
2.On average, over the past month, how many days per week have you been following your eating plan								
Specific diet 3. On how many days in the last seven days did you eat five or more servings of fruits and vegetables?								

4.How many of the last seven days did you eat high fat foods such as red meat or full fat dairy products								
Physical activity 5. How many of the last seven days did you participate in at least 30 minutes of physical activity? (walking)								
6. On how many days of the last seven days did you participate in a specific exercise session such as swimming, walking, biking) other than what you do around the houses or as part of your work?								
Blood Sugar testing 7. On how many days of the last seven days did you test your blood sugar?								
8. On how many days of the last seven days did you test your blood sugar								

the number recommended by your health care provider?								
Foot care								
9. On how many days of the last seven days did you check your feet?								
10. On how many days of the last seven days did you inspect the inside of your shoes?								
Smoking								
11. Have you smoked a cigarette even one puff during the past seven days?								
Alcohol								
12. Did you take a drink containing alcohol during the past seven days?								
MEDICATIONS								
13. How many days of the last seven days did you take your recommended diabetes medications?								