



HEALTHCARE SERVICE UTILIZATION AND CLINICAL ADHERENCE AMONG PATIENTS WITH DIABETES MELLITUS AT KIREHE DISTRICT HOSPITAL RWANDA: A CROSS-SECTIONAL STUDY.

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Abstract

Background:

Non-communicable Diseases including Diabetes Mellitus are increasingly becoming a major public health concern globally, particularly in low- and medium-income countries. Although healthcare services utilization is not a major concern in developed countries, it is associated with worse health outcomes, leading to the increasing burden of diabetes in many developing countries including Rwanda

Objective:

To assess healthcare service utilization and clinical adherence among Patients with Diabetes Mellitus attending Kirehe District Hospital and its Health Centers in Rwanda.

Methods: The study employed a cross-sectional descriptive study design using both quantitative and qualitative approaches. The researcher conducted a patient file review and interviewed key healthcare workers. The sample size for the study was 272 patient files drawn from the target population of 781 files covering a period of one year. Quantitative data were analyzed using descriptive statistics and Chi-square computation using IBM.SPSS. Statistics.v21.

Results:

The study found that more than half (54%) of the respondents had missed more than three DM clinic appointments with 84.9% missing at least one appointment. Only 15.1% adhered to all appointments. Some demographic factors such as education level, social status, and marital status, were significantly associated with health service utilization at $p < 0.005$. Some respondent-related characteristics such as

current medication, and time of diagnosis were similarly significantly associated with health service utilization at $p < 0.005$.

Conclusion: This study concluded that the overall level of healthcare services utilization was low and that most of the DM patients used outpatients and had no DM-related admission. It also revealed that some modifiable respondent-related and health service-related factors influence the utilization of healthcare services among DM patients.

Keywords: Healthcare service utilization, Diabetes Mellitus, Associated Factors

Introduction

Non-communicable diseases (NCDs) present quite a significant public health concern, especially in low and middle-income nations previously concerned mostly with communicable diseases (WHO, 2017). Globally, DM cardiovascular diseases (CVDs), Chronic Obstructive Pulmonary Diseases (COPD), and cancers present the biggest burden of disease, causing 7.9 million deaths annually with DM and CVD accounting for almost 80% of those deaths. (IDF, 2019). In terms of morbidity, approximately 463 million persons were living with DM in 2019, and expected to raise to 578 million by the year 2030. The prevalence is higher in urban compared to rural areas at 10.8% and 7.2% respectively, and in high-income countries compared to low-income countries at 10.4% and 4.0% respectively. Half of the individuals living with diabetes do not know their status (Siddique M et al 2017).

Diabetes Mellitus is a condition with a great negative impact on patients' life and society at large. The increasing burden of diabetes is influenced by the rapid economic development and urbanization in many parts of the World. The most common risk factors related to DM are age, overweight, and lifestyle-related risks such as physical inactivity, unhealthy diet, and smoking which can also lead to raised blood pressure and disturbed blood lipid levels that further complicate the condition. Uncontrolled DM causes severe micro and macrovascular complications that lead to many CVDs, chronic kidney diseases, and neurological diseases among others. These complications lead to a reduced quality of life and life expectancy (IDF, 2019).

WHO (2017) estimates that DM affected over 7% of the world population in 2017. This converts to nearly 500 million individuals. Type 2 DM was the predominant form of DM in the Sub-Saharan Africa region, accounting for more than 90% of cases. In the Middle East and Northern Africa region DM is an emerging concern problem with notable consequences on mortality, morbidity as well as on health care resources. It is estimated that the current prevalence of DM in the African region is 9.7% (WHO, 2017).

In Rwanda, according to the Rwandan Diabetes Association (RDA), the prevalence of DM is 3.2% of the population. Like other neighboring countries and in the region, DM is an important public health problem in Rwanda with reports showing it to be one of the leading five causes of morbidity in CHUB (Mukeshimana, 2014). Testing for Glycated hemoglobin A1c (HbA1c) is crucial in the

management and monitoring of DM with the values representing the average glycemic control over a period of 2-3 months and accounting for both pre and post-prandial levels of blood glucose. This glycemic control is fundamental for preventing and alleviating DM complications. Due to the significance of proper glycemic control in overall health outcomes, routine HbA1c testing is a recommendation for all patients with DM. Guidelines recommend monitoring glycated hemoglobin (HbA1c) at least two to four times each year. Tapela et al (2016). This study aims at evaluating healthcare service utilization among patients with DM enrolled in Kirehe district hospital and HC diabetes clinics and explore patient-related and healthcare system-related factors that influenced the uptake of healthcare services for DM patients during the past year.

Methods and Materials

Research Design

This study used a cross-sectional descriptive research design to assess the level of healthcare service utilization and associated factors among DM patients. The researcher reviewed the patient files together with hospital records from key services like OPD, laboratory, admission, and ER to gather data on socio-demographic and other patient-related factors associated with service utilization. An interview was conducted among selected key healthcare workers to gather data on healthcare service factors related to service utilization

Sample size and sampling

The study used probability random sampling to proportionally identify 16 patient files from the 17 HCs (a total of 272 files) by generating random numbers from a list of all the files constituting the target population.

Data collection methods

The data was captured from the sampled patient files using the data capture sheet and later transferred to a computer for processing. An interview was conducted among the sampled key health workers to gather data on health system-related factors associated with the uptake of health services utilization. The data from the interviews was also inputted into a computer after checking for errors. Data collection was done by data collectors under the supervision of the researcher and each day a debrief and evaluation were done to assess, track and address any potential issue.

Data Analysis

The researcher entered in computerized form, encoded, and verified for omission and errors the quantitative data. Thereafter, the researcher imported data into IBM.SPSS.Statistics.v211 and verified again for omissions and errors, then analyzed them. To summarize the data, descriptive statistics were used. The data were expressed as frequencies and percentages. Cross tabulations were used to determine factors associated with health service utilization. Inferential statistics were reported as chi-squares; and P-values that are set at 0.05.

Ethical consideration

Adequate consideration of the safety and privacy of study participants and principles of prevention of any human rights abuse guided the study. Approval for carrying out this study was obtained from MKU and Kirehe District Hospital administration. The use of codes ensured the privacy, confidentiality, and anonymity of study participants. In addition, the collected data were kept with caution to avoid accessibility by unauthorized persons. The result served academic and research purposes only. All materials and resources utilized during the research process were properly referenced to their respective authors, and recognition of the different contributors was dully made.

Results

Socio-demographic characteristics of the respondents

The distribution of key socio-demographic and economic factors is presented in Table 4.1. These include age, sex, residence, marital status, level of education, religion, and social category.

Table 4. 1:Socio-demographic characteristics of the respondents

| Variables | Frequency | Percentage |
|-----------------------|-----------|------------|
| Age [years] | | |
| <20 | 33 | 1.1 |
| 20 to 29 | 8 | 2.9 |
| 30 to 39 | 22 | 8.1 |
| 40 to 49 | 63 | 23.2 |
| 50 to 59 | 74 | 27.3 |
| ≥60 | 102 | 37.5 |
| Gender | | |
| Male | 109 | 40.1 |
| Female | 163 | 59.9 |
| Education | | |
| None | 8 | 2.9 |
| Primary | 244 | 89.7 |
| Secondary | 20 | 7.4 |
| Religion | | |
| Catholic | 132 | 48.5 |
| Protestant | 52 | 19.1 |
| Muslim | 5 | 1.8 |
| Other | 83 | 30.5 |
| Marital status | | |
| Married | 247 | 90.8 |

| | | |
|---------------------------------|-----|------|
| Single | 12 | 4.4 |
| Divorced | 1 | 0.4 |
| Widowed | 12 | 4.4 |
| Social economic category | | |
| Category 1 | 10 | 3.7 |
| Category 2 | 118 | 43.4 |
| Category 3 | 144 | 52.9 |
| Health Insurance | | |
| Mituelle | 266 | 97.8 |
| Civil servant/military | 3 | 1.1 |
| Private | 3 | 1.1 |

As indicated in Table 4.1, the highest percentage (37.5%) were 60 years or older which is followed by those aged 50 to 59 years (27.3%) and 40 to 49 years (23.2%). There were more male participants (59.9%) compared to females (40.1%). Most of the type DM patients (97.1%) had primary or secondary education and only 2.9% did not have any education at all. Most (67.6%) of the respondents belong to Christian religion and big percentage (90.8%) were married. More than half (52.9%) were from high social economic class (category 3) and the vast majority (97.8%) were using the community health insurance (Mituelle) with all (100%) utilizing some form of ins

4.2.1 Healthcare service utilization

The level of healthcare services utilization among patients with DM attending Kirehe District Hospital and catchment health centers.

Table 4. 2:Health care utilization

| Variables | Frequency | Percentage |
|------------------------------------|------------------|-------------------|
| Missed appointments | | |
| Zero | 41 | 15.1 |
| One | 14 | 5.1 |
| Two | 28 | 10.3 |
| Three | 42 | 15.4 |
| >Three | 147 | 54.0 |
| DM clinic visits past year | | |
| Zero | 124 | 45.6 |
| One | 6 | 2.2 |
| Two | 4 | 1.5 |
| Three | 7 | 2.6 |
| >Three | 131 | 48.2 |
| Other Hosp visits past year | | |

| | | |
|---------------------------------------|-----|------|
| Zero | 244 | 89.7 |
| One | 21 | 7.7 |
| Two | 3 | 1.1 |
| >Three | 4 | 1.5 |
| DM-related admissions | | |
| Zero | 205 | 75.4 |
| ≥ a week | 61 | 22.4 |
| A month | 3 | 1.1 |
| > a month | 3 | 1.1 |
| Hosp services sought past year | | |
| None | 200 | 73.5 |
| Outpatient | 71 | 26.1 |
| Admission | 1 | 0.4 |
| Reason for exiting care | | |
| N/A | 254 | 93.4 |
| Referral | 1 | 0.4 |
| Lost to follow-up | 14 | 5.1 |
| Death | 3 | 1.1 |

As shown in the above table, 54.5% of DM patients have had one to 3 DM clinical visits over the last year under investigation, and the most visited hospital service was outpatient at 26.1%. More than half (54%) of the respondents had missed more than three DM clinic appointments with 84.9% missing at least one appointment. Only 15.1% adhered to all appointments and 45.6% had not made any DM clinic visit within the past year. Besides, DM clinic visits, a big number (89%) of respondents had not utilized any other hospital service within the past year, of those who had sought a service, almost all had sought outpatient services. 24.6% of the respondents had been hospitalized with DM-related complications during the past year. 93.4% of the respondents were still active in the clinic while 5.1% of respondents were lost to follow-up. Three of the patients had exited care through death and one was referred to another clinic.

Discussion

The findings from the current study have demonstrated an overall low adherence to DM clinic appointments with more than half of the respondents missing more than three DM clinic appointments with 84.9% missing at least an appointment. This low adherence mirrors the situation across many countries in the region and Africa in general. For example, studies in Botswana (Fadare *et al.*, 2017), Zambia (Nyirongo *et al.*, 2021), Ghana (Afriyie, 2019), Nigeria (Jackson *et al.*, 2015), Ethiopia (Boshe *et al.*, 2021; Kassahun *et al.*, 2016; Demoz *et al.*, 2020), Uganda (Faisal *et al.*, 2021) and Tanzania (Rwegerera, 2014) have all shown overall low adherence to clinic appointments. In Rwanda, a study done among diabetes mellitus patients attending Kirehe District

Hospital revealed that only 35.4% were adequately adhering to medication regimens (Habtu *et al.*, 2019). This is a troubling pattern particularly because the incidence of diabetes in Africa is on the rise (IDF, 2015). National health systems mainly in Africa are inadequately coping with the burden of non-communicable diseases which is on the rise. This can be explained by poorly developed public health systems and little financial resources (Hall *et al.*, 2011). Sabate & Sabate (2016) suggest that improving the effectiveness of interventions aimed at adherence may provide better health outcomes than just improvements in special medication regimens.

Further afield in the Middle East, similar studies have shown a somewhat higher level of adherence to the recommended clinic visits among diabetes patients. For instance, a study carried out in Palestine on compliance to treatment and contributing factors among type 2 diabetes patients reported a higher adherence at 58.0% (Elsous *et al.*, 2017). This was even more so in the case of Yemen where 70.% of the participants were adhering to the recommended clinic visits (Othman *et al.*, 2020). However, still, in the Middle East other studies in Yemen (Alhariri *et al.*, 2017) and Saudi Arabia (Khan *et al.*, 2012) have emulated the findings of the current study and other studies in Africa where the level of adherence was low. Studies in India have demonstrated moderate adherence. For example a study on compliance to appointments revealed that the compliance level was 57.7% (Mukherjee *et al.*, 2013) while another study in the same country found that 55.1% of the respondents were not adherent. This somewhat increased level of adherence may be attributed to comparatively better health systems in the Middle East and India compared to Africa (Hall *et al.*, 2011).

In developed countries, the picture is quite different, and several studies have demonstrated higher levels of adherence to diabetes regimens. A study conducted in the US to assess adherence and persistence among patients with type 2 diabetes mellitus patients showed over 61% adherence (Mody *et al.*, 2018). Similarly, in Japan, Horii *et al.* (2019), while determining factors affecting adherence in type 2 diabetes mellitus patients, found over 60% adherence. This is not surprising given the advanced health care systems in US and Japan.

Recommendations

1. Improvement of clinic appointment adherence by providing patient support such as lowering costs.
2. Patient support budget to provide home visits and patient education.
3. Training of health care workers in management of DM.
4. Improving laboratory services and pharmaceutical supply chain.

Suggestions for further Study

1. This study may be continued by a longitudinal study to determine the causality and its direction in relation to the factors affecting utilization of health care services by DM patients
2. It could be interesting to conduct a similar study in other study settings across the country and the region to create a more comprehensive knowledge base in relation to health care utilization among DM patients.

Authors' contribution

Rwigema Gilbert designed the study, collected, analyzed, interpreted the data and wrote the manuscript, while Nasiru Sani and Onesmus Marete supervised the study, contributed to data analysis and manuscript review. All authors have read and approved the manuscript for publication.

Declaration of conflict of interest

The authors declare no conflict of interest with regards to this research and authorship of this article.

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References

- Afriyie, G. (2019). Non-Adherence to Medication and Associated Factors among Type 2 Diabetes Mellitus Patients Attending Tema General Hospital. [PhD Thesis]. University of Ghana.
- Alhariri, A., Daud, F., Almaiman, A., & Saghir, S. (2017). Factors associated with adherence to diet and exercise among type 2 diabetes patients in Hodeidah city, Yemen. *Life*, 7(3), 264–271.
- American Diabetes Association (2000). Standards of medical care for patients with diabetes mellitus (Position Statement). *Diabetes Care* 23 (1). (n.d.).
- Andersen, R. (2008). National health surveys and the behavioral model of health services use. *Medical Care*, 46(7), 647–653. (n.d.).
- Bavuma, C.M. (2020) Socio-demographic and clinical characteristics of diabetes mellitus in rural Rwanda: time to contextualize the interventions? A cross-sectional study. *BMC Endocr Disord* 20, 180. <https://doi.org/10.1186/s12902-020-00660-y>. (n.d.).
- Boshe, B. D., Yimar, G. N., Dadhi, A. E., & Bededa, W. K. (2021). The magnitude of non-adherence and contributing factors among adult outpatient with Diabetes Mellitus in

- Dilla University Referral Hospital, Gedio, Ethiopia. *PloS One*, 16(3), e0247952.
<https://doi.org/10.1371/journal.pone.0247952>
- Buor. (2005). Buor D. Socio-economic status and the utilization of physicians services: results from the Canadian national population health survey. *Soc. Sci. Med.* 2005;5(1):123–133. [PubMed] [Google Scholar]. (n.d.).
- Demoz, G. T., Wahdey, S., Bahrey, D., Kahsay, H., Woldu, G., Niriayo, Y. L., & Collier, A. (2020). Predictors of poor adherence to antidiabetic therapy in patients with type 2 diabetes: A cross-sectional study insight from Ethiopia. *Diabetology & Metabolic Syndrome*, 12, 62. <https://doi.org/10.1186/s13098-020-00567-7>
- Elsous, A., Radwan, M., Al-Sharif, H., & Abu Mustafa, A. (2017). Medications adherence and associated factors among patients with type 2 diabetes mellitus in the Gaza Strip, Palestine. *Frontiers in Endocrinology*, 8, 100.
- Fadare, J., Moshomo, T., Godman, B., Meyer, J. C., Gollakota, S., Gaenamang, M., Oyewo, T. A., Rivera, Y. P., Mhimbira, F. A., & Rwegerera, G. M. (2017). Antidiabetic medication adherence and associated factors among patients in Botswana; implications for the future.
- Faisal, K., MEKURIYA, T., & Tusiimire, J. (2021). Factors Associated With Non-Adherence To Antidiabetic Medication Among Patients at Mbarara Regional Referral Hospital, Mbarara, Uganda.
- Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health behavior and health education: Theory, research, and practice*. John Wiley & Sons.
- Grant, C. & Osanloo, A. (2014). Understanding, Selecting, and Integrating a Theoretical Framework in Dissertation Research: Creating the Blueprint for ‘House’. *Administrative Issues Journal: Connecting Education, Practice and Research*, Pp. 12-22 . (n.d.).
- Habtu, M., Uwingabire, S., Mureithi, C., & Gashegu, M. (2019). Knowledge and Attitude of Diabetes Mellitus and Adherence to Treatment Regimen among Diabetic Patients Attending Kirehe District Hospital, Rwanda. *J Diabetes Clin Prac* 2: 109.
- Hall, V., Thomsen, R. W., Henriksen, O., & Lohse, N. (2011). Diabetes in Sub Saharan Africa 1999-2011: epidemiology and public health implications. A systematic review. *BMC public health*, 11(1), 1-12.
- Harmon, C., & Nolan, B. (2001). Health insurance and health services utilization in Ireland. *Health Economics*, 10(2), 135-145. . (n.d.).

- Horii, T., Momo, K., Yasu, T., Kabeya, Y., & Atsuda, K. (2019). Determination of factors affecting medication adherence in type 2 diabetes mellitus patients using a nationwide claim-based database in Japan. *PloS one*, 14(10).
- International Diabetes Federation. *IDF diabetes atlas - 7th edition*. Brussels:International Diabetes Federation (IDF); 2015. (n.d.).
- Jackson, I. L., Adibe, M. O., Okonta, M. J., & Ukwe, C. V. (2015). Medication adherence in type 2 diabetes patients in Nigeria. *Diabetes Technology & Therapeutics*, 17(6), 398–404. <https://doi.org/10.1089/dia.2014.0279>
- Kale MS, Bishop TF, Federman AD, Keyhani S(2013) Trends in the overuse of ambulatory health care services in the United States. *JAMA Internal Medicine*. ;173(2):142–148. . (n.d.).
- Kassahun, A., Fanta Gashe, E. M., & Rike, W. A. (2016). Nonadherence and factors affecting adherence of diabetic patients to anti-diabetic medication in Assela General Hospital, Oromia Region, Ethiopia. *Journal of Pharmacy & Bioallied Sciences*, 8(2), 124.
- Khan, A. R., Al-Abdul Lateef, Z. N., Al Aithan, M. A., Bu-Khamseen, M. A., Al Ibrahim, I., & Khan, S. A. (2012). Factors contributing to non-compliance among diabetics attending primary health centers in the Al Hasa district of Saudi Arabia. *Journal of Family & Community Medicine*, 19(1), 26–32. <https://doi.org/10.4103/2230-8229.94008>
- Mukeshimana, M.M. and Nkosi ZZ.(2014) Communities' knowledge and perceptions of type two diabetes mellitus in Rwanda: a questionnaire survey. *J Clin Nurs*; 23: 541– 549. (n.d.).
- Mukherjee, S., Sharmasarkar, B., Das, K. K., Bhattacharyya, A., & Deb, A. (2013). Compliance to anti-diabetic drugs: Observations from the diabetic clinic of a medical college in kolkata, India. *Journal of Clinical and Diagnostic Research: JCDR*, 7(4), 661–665. <https://doi.org/10.7860/JCDR/2013/5352.2876>
- Nyirongo, S., Mukwato, P. K., Musenge, E. M., & Kalusopa, V. M. (2021). Adherence to Treatment by Patients with Type 2 Diabetes Mellitus at Monze Mission Hospital, Monze, Zambia. *Open Journal of Nursing*, 11(3), 184–203.
- Rwegerera, G. M. (2014). Adherence to anti-diabetic drugs among patients with Type 2 diabetes mellitus at Muhimbili National Hospital, Dar es Salaam, Tanzania- A cross-sectional study. *The Pan African Medical Journal*, 17, 252. <https://doi.org/10.11604/pamj.2014.17.252.2972>

Siddique, M.K.B., Islam, S.M.S., Banik, P.C. et al.(2017)Diabetes knowledge and utilization of healthcare services among patients with type 2 diabetes mellitus in Dhaka, Bangladesh. BMC Health Serv Res 17, 586. . (n.d.).

Tapela N, Habineza H, Anoke S, Harerimana E, Mutabazi F, et al. (2016) Diabetes in Rural Rwanda: High Retention and Positive Outcomes after 24 Months of Follow-up in the Setting of Chronic Care Integration. Int J Diabetes Clin Res 3:058. 10.23937/2377-363. (n.d.).

World Health Organization.(2017) Global report on diabetes. Geneva: World Health Organization. . (n.d.).

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