Navigating Diabetes Care in Jasikan District, Ghana: An Assessment of Knowledge and Health Behaviors

ABSTRACT

Background: Diabetes is a persistent metabolic disorder characterised by high levels of blood glucose. Over time, it leads to cardiovascular, ocular, renal, and neurological damage. The most prevalent kind is type 2 diabetes, typically found in adults, which happens when the body develops resistance to insulin or fails to produce a enough amount of insulin. The incidence of type 2 diabetes has significantly increased in recent years mostly as a result of lifestyle modifications. Type 1 diabetes arises from an autoimmune process that leads to the death of insulin-secreting cells (B cells) in the pancreas. Typically, it begins during adolescence but can manifest at any stage of life. The objective of the study is to evaluate the degree of knowledge and health-seeking behaviours of individuals with diabetes in the Jasikan district.

Methods:A descriptive cross-sectional study was conducted using non-probability selection, namely convenience sampling, to select a total of 114 respondents. Data was collected using a standardised questionnaire. The data was stored and analysed using SPSS version 25 for mac, which is a Statistical Package for Social Sciences.

Results: The majority of patients are aware that regular hospital check-ups are essential for their medical care. The study uncovered that nearly all individuals with diabetes in the Jasikan district promptly seek medical assistance from the hospital whenever they experience health issues. Alternatively, 48.2% of individuals seek guidance from religious leaders, 9.6% turn to herbal remedies, and 2.6% choose to self-medicate. Just 39.5% of the participants acknowledged that the primary factor behind diabetes is insufficient production of efficient insulin within the body. The vast majority of respondents (87.7%) recognised that diabetes leads to an increase in blood glucose levels. Additionally, 72.8% acknowledged that a fasting blood sugar level of 11.1 is excessively elevated.

Conclusions: Individuals with diabetes in the Jasikan district possess a limited amount of knowledge regarding their medical condition. They possess expertise regarding blood sugar levels in diabetes, the associated difficulties, and the necessity for frequent and regular check-ups. However, they have a deficiency in understanding on the many forms and underlying causes of diabetes, as well as the symptoms associated with hypoglycemia and hyperglycemia. The majority of individuals with diabetes in the district frequently turn to the hospital for assistance if they experience health issues. As an alternative, many turn to religious leaders, natural remedies, and over-the-counter pharmaceuticals.

Key Words: ***Diabetes, non-communicable disease, Knowledge, health-seeking behaviours***

INTRODUCTION

Diabetes is a chronic, non-communicable disease that is becoming increasingly prevalent worldwide. Before 2019, there were four main categories of diabetes that were recognised, namely: Type 1, Type 2, gestational diabetes, and other particular varieties (Alberti et al., 1999). The present categorization encompasses Type 1 diabetes, Type 2 diabetes, Hybrid forms of diabetes, other particular categories, unclassified diabetes, and hyperglycemia initially discovered during pregnancy (WHO, 2019). The International Diabetes Federation's recent estimates indicate that around 463 million persons aged 20 to 79 were diagnosed with diabetes in 2019 (IDF, 2019). The prevalence of diabetes mellitus among adult Ghanaians in Ghana was estimated to be high, at 6.46%. Notable risk factors linked to diabetes include having a family history of diabetes, being physically inactive, and being over the age of 40 (Boaheng, Katanka, Tuffour, Eghan, &Mbanya, 2018). Individuals with inadequately managed diabetes often experience a rapid progression of problems, such as diabetic ulcers, retinopathy, cataracts, peripheral nerve damage, nephropathy, and myocardial infarction. This number is expected to increase to 700 million by 2045. Diabetes imposes a significant strain on individuals, families, healthcare systems, and society at large due to the difficulties it brings and the economic expenses it incurs.

Efficient management of diabetes necessitates not solely the availability of healthcare facilities and medicines, but also sufficient understanding of the condition and suitable health-seeking behaviours. Acquiring knowledge about diabetes, encompassing its aetiology, manifestations, ramifications, and treatment, is imperative for persons to make well-informed choices about their well-being. Engaging in health-seeking behaviours, such as consistently attending medical check-ups, adhering to prescribed medication, maintaining a nutritious diet, and participating in regular physical activity, is crucial for effectively controlling diabetes and reducing the risk of complications.Although information and services are readily accessible, research indicates that a significant number of patients with diabetes have insufficient understanding of the condition and may not adopt the most effective health-seeking practices. The lack of understanding and

appropriate actions in this area may lead to unfavourable health results and a higher likelihood of problems for people with diabetes.

Gaining insight into the cognition and health-seeking habits of patients with diabetes is crucial for formulating efficacious approaches to enhance diabetes management and results. The objective of this study is to evaluate the level of knowledge and health-seeking behaviours among individuals with diabetes in the JasikanDistrict of Ghana, as well as to determine the factors that have an impact on these outcomes. Through the identification of deficiencies in knowledge and behaviours, healthcare clinicians and policymakers can create focused interventions to enhance diabetes treatment and alleviate the impact of the condition.

A thorough understanding of diabetes is an essential element of diabetic management. Multiple studies have demonstrated that enhancing patient understanding of an illness and its potential problems yields substantial advantages in terms of patient adherence to treatment and the reduction of disease-related complications (Murugesan, Chamukuttan, Shobhana, Roglic, & Ramachandran, 2007). After conducting a thorough search on multiple websites, no published material was found that provides further information on the subject matter of this study in the Jasikan district. This provided a foundation for doing a study on evaluating the knowledge and health-seeking behaviours of individuals with diabetes in the Jasikan district.

MATERIAL AND METHODS

Study design: A cross-sectional descriptive study design was used in conducting the study. Since the study was carried out within a particular limited time frame of 8 weeks, the cross-sectional design fit in analyzing the objective of the study which wasto assess knowledge and the health seeking behaviour of diabetics in the Jasikan district.

Setting: Jasikan Municipal is one of the 261 Metropolitan, Municipal and District Assemblies (MMDAs) in Ghana. It is classified as one of the 8 municipalities and districts in the Oti Region. The Biakoye District Assembly was established in 1989 under the jurisdiction of L.I 1464. In 2004, it was separated from the original Jasikan District, leaving behind the Jasikan Municipal Assembly. Jasikan Municipal is surrounded by Lake Volta to the west, and is bordered by the Kpando and Hohoe Municipalities to the south, and the Krachi East and Kadjebi Districts to the

north (Jasikan Municipal Assembly Report, 2023). The municipality possesses adequate health infrastructure, comprising of a hospital, six health facilities, three community health planning services (CHPS complex), and a private clinic. Jasikan, the municipal capital, is located 110 kilometres northeast of Ho and 265 kilometres from the nation's capital, Accra. The Municipality encompasses a land area of approximately 1,355 square kilometres, as stated in the Jasikan Municipal Assembly Report of 2023. The population of Jasikan Municipal, as reported in the 2021 population and housing census, is 59,695. This figure comprises 30,441 males and 29,254 females.

Target Population: The composition of the group consists of individuals with diabetes who attend the diabetic clinic at Jasikan Municipal Hospital every Tuesday. Respondents who were chosen to participate willingly completed a questionnaire.

Inclusion Criteria: The study recruited individuals based on the following criteria: Prior attendance at the diabetic clinic for a duration of at least six months, possessing the mental capacity to provide informed permission. The selection criteria for data collection include fluency in English, Twi, or Ewe, as well as being present on the day of data collection. This is to eliminate bias, as those who attend the clinic regularly are likely to have more knowledge about the disease compared to those who visit just once or twice.

Exclusion Criteria: The study excluded participants visiting the diabetes clinic based on the following criteria: Individuals who do not have diabetes, as well as individuals with diabetes who have been receiving treatment at the clinic for less than 6 months who are currently in the hospital on the data collection day.

Sampling Technique and Size: The researchers utilised the convenience sampling method. This requires respondents to be easily accessible and willing to participate in the study. The Diabetic clinic at the Jasikan District Hospital receives an average of 158 diabetic patients every month. As 158 is closer to 160(N), the relevant sample size according to the Krejcie and Morgan (1970) sampling method table is 1(s).

Data Collection Instrument: This study utilised a self-designed questionnaire and a portion of the 24-item Diabetes Knowledge Questionnaire (DKQ) created by Garcia, Villagomez, Brown, Kouzekanani, and Hanis in 2001.

Data Analysis: The acquired data was manually sorted and cleansed. The data was encoded, inputted, and analysed using the Statistical Package for Social Sciences (SPSS) software, specifically version 22. Variables were established during the variable view stage of the SPSS software. The data was subsequently analysed comprehensively utilising descriptive statistical tools, such as frequency distribution tables.

Ethical Issues: Prior to administering the questionnaires, all participants were asked for their informed consent. Every participant received a detailed explanation regarding the significance and purpose of the research. The participants were guaranteed secrecy and given the option to withdraw from the study.

RESULTS

The demographic data shows the gender of respondents who responded to the questionnaire were 100%. 63.2% of them were female and 36.8% of them were male. Gender balance favours the female according to the analysis made because of the profession.This section describes the category of ages as represented. Majority of the respondents are between the ages of 51 years and above (71.9%). 20.2% of the respondents fall between 41-50 years. Also, respondents 31-40 years represent 6.1%. Finally, 1.8% of them are between 11-30 years. This shows that, adult form part of the majority of respondents in the Municipality. Concerning education, majority of the respondents (34.2%) prefer not to disclose it so they indicated other. 32.5% and 26.3% of them were traders and farmers respectively. Whiles 5.3% and 1.8% of the respondents represent civil servants and students respectively. Again, the demographic data shows that majority of the respondents (77.2%) were Christian whiles 21.9% of them were Muslim and the rest were 0.9%. with the respondents' level of education, 73.7% of them had formal education with 23.7% having primary education, 35.1% secondary education and 14.9% tertiary education. Whiles 2.6% had non-formal education and 23.7% indicated none. Finally, with their marital status, 64.9% of the respondents are married, 6.1% are single, 5.3% are divorced and 23.7% are widowed.

RESPONDENTS KNOWLEDGE OF DIABETES

The frequency table below is a breakdown of the options respondents chose from the questionnaire designed, which is an extract of the 24-item version of the Diabetes knowledge Questionnaire (DKQ) developed by (Garcia et al., 2001).

Table 1 DISTRIBUTION OF RESPONDENTS RESPONSE TO THE QUESTIONNAIRE ADMINISTERED.

	QUESTIONS	FREQUENCY				PERCENTAGE			
		YES	NO	DON'T KNOW	MISSING	YES	NO	DON'T KNOW	MISSING
1	Eating too much sugar and sweet food is a cause of diabetes.	**47**	**38**	**29**	**0**	**41.2**	**33.3**	**25.4**	**0**
2*	The usual cause of diabetes is lack of effective insulin in the body.	**45**	**5**	**64**	**0**	**39.5**	**4.4**	**56.1**	**0**
3	Diabetes is caused by failure of the kidneys to keep sugar out of the urine.	**41**	**11**	**61**	**1**	**36.0**	**9.6**	**53.5**	**0.9**
4	Kidneys produce insulin.	**17**	**18**	**79**	**0**	**14.9**	**15.8**	**69.3**	**0**
5	In untreated diabetes, the amount of sugar in the blood usually increases.	**100**	**1**	**13**	**0**	**87.7**	**0.9**	**11.4**	**0**
6	If I am diabetic, my children have a higher chance of being diabetic.	**54**	**26**	**34**	**0**	**47.4**	**22.8**	**29.8**	**0**
7	Diabetes can be cured.	**22**	**62**	**30**	**0**	**19.3**	**54.4**	**26.3**	**0**
8	A fasting blood sugar level of 11.1 is too high.	**83**	**8**	**23**	**0**	**72.8**	**7.0**	**20.2**	**0**
9	The best way to check my diabetes is by testing my urine	**61**	**45**	**8**	**0**	**53.5**	**39.5**	**7.0**	**0**
10	Regular exercise will increase the need for insulin or other diabetic medication	**21**	**55**	**38**	**0**	**18.4**	**48.2**	**33.3**	**0**
11	There are two types of diabetes: Type 1 & Type 2	**37**	**3**	**74**	**0**	**32.5**	**2.6**	**64.9**	**0**
12	Medication is more important than diet and exercise to control my diabetes	**46**	**39**	**29**	**0**	**40.4**	**34.2**	**25.4**	**0**
13	Diabetes often causes poor circulation	**65**	**9**	**40**	**0**	**57.0**	**7.9**	**35.1**	**0**
14	Diabetes can have an effect on vision	**92**	**14**	**8**	**0**	**80.7**	**12.3**	**7.0**	**0**
15	Cuts and abrasions on diabetes heal more slowly	**99**	**8**	**7**	**0**	**86.8**	**7.0**	**6.1**	**0**
16	Diabetes can damage my kidneys	**62**	**4**	**48**	**0**	**54.4**	**3.5**	**42.1**	**0**
17	Diabetes can cause loss of feelings in my hands, fingers and feet.	**100**	**6**	**8**	**0**	**87.7**	**5.3**	**7.0**	**0**
18	Shaking and sweating are signs of high blood sugar	**40**	**33**	**41**	**0**	**35.1**	**28.9**	**36.0**	**0**

19	Urinating frequently and thirst are signs of low blood sugar.	**22**	**46**	**46**	**0**	**19.3**	**40.4**	**40.4**	**0**
20	A diabetic diet consists mostly of special foods	**49**	**53**	**12**	**0**	**43.0**	**46.5**	**10.5**	**0**
21	Regular hospital check-ups are not necessary for diabetics	**9**	**103**	**2**	**0**	**7.9**	**90.4**	**1.8**	**0**

4.3 Table 2 :RESPONDENTS HEALTH SEEKING BEHAVIOUR

Qn2.How long do you usually wait at home before seeking for help at a health facility?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 7days	98	86.0	86.7	86.7
	1 - 2weeks	6	5.3	5.3	92.0
	3 - 4weeks	9	7.9	8.0	100.0
	Total	113	99.1	100.0	
Missing	999	1	.9		
Total		114	100.0		

Qn3. What are the reasons why you look for help at the option selected above ?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Easy accessibility	5	4.4	4.4	4.4
	Affordable	2	1.8	1.8	6.1
	Staff attitude	1	.9	.9	7.0
	Most effective	105	92.1	92.1	99.1
	Other	1	.9	.9	100.0
	Total	114	100.0	100.0	

Q4. If you visit the hospital and you feel the treatment does not help, where do you go next ?

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Herbalist	11	9.6	9.7	9.7
	Pastor/Imam	55	48.2	48.7	58.4
	Community pharmacy/Chemical shop	3	2.6	2.7	61.1
	Other	44	38.6	38.9	100.0
	Total	113	99.1	100.0	
Missing	999	1	.9		
Total		114	100.0		

DISCUSSION

Evaluating the level of knowledge among individuals with diabetes in the Jasikan District.

Understanding the sociodemographic characteristics of the clients in the sample is crucial as it impacts various outcomes, such as knowledge about diabetes signs, symptoms, and complications, as well as adherence to prescribed medication, dietary guidelines, and other treatment options. 23.7% of the individuals in our sample lack any formal education, while an additional 23.7% possess only a basic level of education. Just 14.9% of individuals attained a tertiary level education. The influence of this demographic component is apparent in the outcomes, as clients have shown a lack of understanding when faced with intricate inquiries. For example, 69.3% of individuals were unaware of the specific organ responsible for producing insulin.

The study findings indicated that a significant proportion of individuals with diabetes were unaware of the aetiology of the condition. Just 39.5% of the participants acknowledged that the primary cause of diabetes is insufficient production of efficient insulin in the body. This finding aligns with a comparable investigation carried out in Portugal by Eva Menino in 2017. In addition, Hu et al. (2013) found that over 50% of users lacked knowledge about the causes and physiology of diabetes. Specifically, when asked about the production of insulin by the kidneys, only 39.7% of users responded correctly.

According to our research, most of the participants had a strong comprehension of blood sugar levels in individuals with diabetes. 87.7% of individuals recognised that untreated diabetes typically leads to an elevation in blood sugar levels. Additionally, 72.8% acknowledged that a fasting blood sugar level of 11.1 is excessively elevated.

Our research findings indicate that 40.4% of the individuals with diabetes who were interviewed have the mistaken belief that medicine is of greater significance than food and exercise in managing diabetes. This is concerning as it indicates that a significant number of patients underestimate the importance of exercise and a suitable diet, which are crucial for managing diabetes.

It is crucial to acknowledge that the sample users are aware of the intricacies associated with diabetes. The majority of individuals answered the questions "Can diabetes cause damage to the kidneys?" accurately. "Diabetes can result in peripheral neuropathy, leading to sensory loss in the hands, fingers, and feet," "Wounds and injuries in individuals with diabetes exhibit delayed healing," "Diabetes frequently induces impaired blood circulation," "Diabetes can impact visual acuity."

The findings suggest that most users in the sample exhibit a lack of understanding regarding the symptoms of hypoglycemia and hyperglycemia. The investigation conducted by Menino et al. in 2017 in Portugal showed a comparable pattern. This suggests that a significant number of patients may lack the ability to recognise warning indicators, which can have a significant impact on their ability to effectively manage their diabetes.

A portion of the participants in our study acknowledge the presence of genetic predisposition in the development of diabetes, as 47.4% acknowledged that their offspring have an elevated likelihood of developing the condition. This is especially crucial since these individuals with diabetes instruct their children to be vigilant about lifestyle behaviours, such as nutrition and exercise, and to undergo frequent screenings for high blood sugar levels.

Our research reveals that approximately 54.4% of the interviewed individuals with diabetes are aware that there is no cure for this condition. Given the absence of a cure for diabetes, individuals with the condition recognise the necessity of adhering to a regular and prolonged pharmaceutical regimen in order to effectively control the disease and mitigate the risk of complications. Acquiring this knowledge significantly enhances adherence to medicine and medical advice. Furthermore, a significant majority of the respondents (90.4%) concurred that regular hospital check-ups are indispensable for individuals with diabetes. The proof of this awareness is the fact that the majority diligently adhere to their scheduled check-ups. This

facilitates the efficient assessment of the effectiveness of the treatment and the appropriate surveillance of the patient's condition.

An evaluation of the health-seeking behaviours of individuals with diabetes in the Jasikan District.

The ramifications of diabetes can be extremely detrimental. Patients experiencing discomfort, fear, and an urgent need for assistance explore many avenues to get relief. Examples of such locations include hospitals, religious leaders' establishments, herbalists' practices, chemical shops, and other such sites. The findings of our study reveal that around 98% of individuals with diabetes actively seek medical assistance from healthcare institutions whenever they have health issues.

An further significant discovery from the study is that 86% of participants reported experiencing symptoms within the initial seven days after their beginning. This is a favourable sign for effective management results as it allows healthcare staff to swiftly detect issues and address them appropriately before they worsen.

The majority of individuals with diabetes who took part in the study revealed that they rely on health facilities as the most efficacious means of seeking treatment. This demonstrates their confidence in the healthcare systems within the district.

48.2% of individuals choose to seek assistance from their religious leader as an alternative to obtaining aid from the hospital. Religion holds great importance in the life of the inhabitants of Jasikan. Being devout individuals, they actively pursue divine and spiritual remedies for their myriad issues, including health ailments. Therefore, it is not unexpected that a significant proportion of individuals will seek assistance from this particular resource.

Once again, certain participants expressed a desire to use herbal remedies as a substitute for conventional treatment in order to control their illness. Despite the growing prevalence of modern medicine in Ghana, herbal medicine has persisted as a complementary form of healthcare that many people still depend on. Herbal medicine has been a significant factor in the provision of healthcare since ancient times (Bright, 2013).

In addition, a small number of the participants choose to engage in self-medication instead of seeking assistance from a medical facility. Self-medication is a prevalent phenomenon in Ghana, as evidenced by a study conducted by Donkor, Tetteh-Quarcoo, Nartey, and Agyeman in 2012. Several respondents indicated that they visited the chemical shop because to factors such as peer influence, financial constraints preventing them from going to the hospital, and experiencing symptoms that were not perceived as severe.

CONCLUSION

Based on the comprehensive research completed in the Jasikan district, it can be inferred that individuals with diabetes possess limited knowledge of their illness. Diabetics in the Jasikan district possess knowledge of the fact that diabetes leads to an increase in blood sugar levels, yet only a minority (39.5%) are aware of the specific aetiology of diabetes. The majority of individuals with diabetes possess a comprehensive understanding of the various issues associated with the condition and are adept at recognising the initial indicators. Approximately fifty percent of individuals comprehend that diabetes is incurable and acknowledge the significance of food, exercise, and medication in effectively controlling the condition. The majority of patients (90.4%) are aware of the crucial importance of regular hospital check-ups in their treatment. Based on the research findings, it can be concluded that nearly all individuals with diabetes in the Jasikan district (98%) turn to the hospital for assistance if they experience health issues. And they do so promptly. As a second alternative, they turn to religious leaders, herbal remedies, and over-the-counter pharmaceuticals.

REFERENCE

Al-Maskari, F., El-Sadig, M., Al-Kaabi, J. M., Afandi, B., Nagelkerke, N., & Yeatts, K. B. (2013). Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. *PLoS One, 8*(1), e52857. doi:10.1371/journal.pone.0052857

Alberti, K., P, A., & J-P, A. (1999). *Definition, Diagnosis and Classification of Diabetes Mellitus and its complications*. Retrieved from

https://apps.who.int/iris/bitstream/handle/10665/66040/WHO_NCD_NCS_99.2.pdf;jsessionid=ED1A9ACBC0F71F252565EA5FEF7171E5?sequence=1

Anwar, M., Green, J., & Norris, P. (2012). Health-seeking behaviour in Pakistan: a narrative review of the existing literature. *Public Health, 126*(6), 507-517. doi:10.1016/j.puhe.2012.02.006

Boaheng, M. A.-., Katanka, O. S.-., Tuffour, A. B., Eghan, B., & Mbanya, J. C. (2018). Prevalence and risk factors for diabetes mellitus among adults in Ghana. Retrieved from https://doi.org/10.1093/inthealth/ihy067

Bright, A. (2013). *Utilization of Traditional Herbal Medicine and its Role in Health Care Delivery in Ghana: The Case of Wassa Amenfi West District.* Kwame Nkrumah University of Science and

Technology, Retrieved from http://ir.knust.edu.gh/xmlui/handle/123456789/5332?show=full

Directorate, J. H. (2019). *PROFILE OF JASIKAN DISTRICT HEALTH DIRECTORATE*.

Donkor, E. S., Tetteh-Quarcoo, P. B., Nartey, P., & Agyeman, I. O. (2012). Self-medication practices with antibiotics among tertiary level students in Accra, Ghana: a cross-sectional study. *Int J Environ Res Public Health, 9*(10), 3519-3529. doi:10.3390/ijerph9103519

Eva Menino, A. M., Maria Clarisse. (2017). Validation of Diabetes Knowledge Questionnaire (DKQ) in the Portuguese Population. *Diabetes and Obesity International Journal, 2*, 8. Retrieved from https://medwinpublishers.com/DOIJ/DOIJ16000S1-002.pdf

Fortunate Atwine, K. H. (2016). Healthcare-seeking behaviour and management of type 2 diabetes: FromUgandan traditional healers' perspective. *International Journal of Africa Nursing Sciences, 5*, 17 - 23. Retrieved from https://reader.elsevier.com/reader/sd/pii/S2214139116300282?token=FECE78BFB84A8

B000B7EA8A8D44F047CC59E3037CC15993E8A5B6C5B62389E38F3A9B9D0E11FB2E04F0E724DF328A7F2

Garcia, A. A., Villagomez, E., Brown, S. A., Kouzekanani, K., & Hanis, C. L. (2001). The Starr County Diabetes Education Study: development of the Spanish-language Diabetes Knowledge Questionnaire. *Diabetes care, 24*, 16-21. doi:10.2337/diacare.24.1.16

Gautam, A., Bhatta, D. N., & Aryal, U. R. (2015). Diabetes related health knowledge, attitude and practice among diabetic patients in Nepal. *BMC Endocrine Disorders, 15*(1), 25. doi:10.1186/s12902-015-0021-6

Hjelm, K., & Atwine, F. (2011). Health-care seeking behaviour among persons with diabetes in Uganda: an interview study. *BMC International Health and Human Rights, 11*(1), 11. doi:10.1186/1472-698X-11-11

IDF. (2019). Diabetes facts & figures. Retrieved from https://www.idf.org/aboutdiabetes/what-is-diabetes/facts-figures.html

Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, *30*(3), 607-610. https://doi.org/10.1177/001316447003000308

Mellitus, T. C. o. t. J. D. S. o. t. D. C. o. D., Seino, Y., Nanjo, K., Tajima, N., Kadowaki, T., Kashiwagi, A., . . . Ueki, K. (2010). Report of the Committee on the Classification and Diagnostic Criteria of Diabetes Mellitus. *Journal of Diabetes Investigation, 1*(5), 212-228. doi:10.1111/j.2040-1124.2010.00074.x

Mufunda, E., Wikby, K., Björn, A., & Hjelm, K. (2012). Level and determinants of diabetes knowledge in patients with diabetes in Zimbabwe: a cross-sectional study. *Pan Afr Med J, 13*, 78.

Murugesan, N., Chamukuttan, S., Shobhana, R., Roglic, G., & Ramachandran, A. (2007). Awareness about Diabetes and its Complications in the General and Diabetic Population in a City in Southern India. *Diabetes research and clinical practice, 77*, 433-437. doi:10.1016/j.diabres.2007.01.004

Obirikorang, Y., Obirikorang, C., Anto, E. O., Acheampong, E., Batu, E. N., Stella, A. D., . . . Brenya, P. K. (2016). Knowledge of complications of diabetes mellitus among patients visiting the diabetes clinic at Sampa Government Hospital, Ghana: a descriptive study. *BMC Public Health, 16*(1), 637. doi:10.1186/s12889-016-3311-7

Ovenseri-Ogbomo, G. O., Abokyi, S., Kuffuor, G. A., & Abokyi, E. (2013). Knowledge of diabetes and its associated ocular manifestations by diabetic patients: A study at Korle-Bu Teaching Hospital, Ghana. *Niger Med J, 54*(4), 217-223. doi:10.4103/0300-1652.119602

WHO. (2016). *Global Report on Diabetes*. Geneva: World Health Organization.

WHO. (2019). *Classification of Diabetes Mellitus 2019*(pp. 40).