

## Original Article

# Self-Care Related Knowledge and Self-care Practices among Type 2 Diabetic Patients Attending Selected Hospitals in Oyo State, Nigeria

**Olaoye Titilayo**

Department of Public Health, Babcock University

**Aina Modupe**

Department of Public Health, Babcock University

**Correspondence:** Olaoye Titilayo, email address: olaoyet@babcock.edu.ng

### Abstract

**Background:** Diabetes is a serious, long-term condition with major impact on the lives and well-being of individuals, families, and societies worldwide.

**Objective:** This study assessed self-care related knowledge and practices among Type 2 Diabetic patients attending selected hospitals in Oyo State, Nigeria

**Methodology:** A Hospital based descriptive cross-sectional design was adopted. A total of 120 diabetic patients were selected from four general hospitals in Oyo State. An interviewer-administered questionnaire measuring patients' self-care related knowledge, and self-care practices were used to collect data. Data was analysed using IBM SPSS version 23. Variables that are significant at p-value <0.05 in bivariate analysis were entered in multivariate regression analysis.

**Results:** The mean age of respondents was 61.00 ±8.242 years. Most 94(78.3%) of the respondents had good self-care related knowledge. Majority 113(94.2%) of the respondents had poor diabetic self-care practices. There was no significant relationship between the respondent's self-care related knowledge and self-care practices ( $r = 0.001$ ;  $p = 0.994$ ). Evaluation of the domain specific self-care practices revealed that patient foot care ( $r = 0.27$ ;  $p = 0.002$ ), and physical activity ( $r=0.25$ ;  $p = 0.005$ ) were significant with patient self-care knowledge. Also, respondents' self-care related knowledge contributed 6% to their physical activity ( $R^2 = 0.06$ ;  $p= 0.005$ ), and 7% to their foot care practices ( $R^2= 0.07$ ;  $p= 0.002$ ).

**Conclusion/ Recommendation:** Most of the respondents had good knowledge, and poor self-care practices. Health workers should as a matter of urgency introduce health classes to diabetic patients at least once a week to foster good adherence to self-care activities.

**Keywords:** Knowledge, Self-care practice, Diabetic, Oyo, Nigeria

## Background

People living with type 2 diabetes are predicted to increase exponentially in developing countries including Nigeria within the next two decades (International Diabetes Federation [IDF],2015). Worldwide, four hundred and sixty-three million people have diabetes out of which 19 million lived in the African Region (IDF,2019). In 2017, in Nigeria the estimated prevalence of diabetes among persons aged 20-69 was 1.7% (IDF, 2017). A prevalence of 3% was reported in 2020(IDF, 2020).

Studies have revealed a high trend of diabetes prevalence in Oyo State, Nigeria (Odeyinka & Ajayi, 2017; Rasaki et al, 2017). Odeyinka and Ajayi (2017) reported a prevalence of 3.4% in Oyo State. Also, Rasaki et al, (2017) reported a prevalence of diabetes to be 93.7% in females, and 6.3% in males, while prevalence of diabetics among pre-diabetes was 85.0% in females and 15.0% in males. This has been attributed to their dietary pattern and genetic predispositions (Rasaki et al, 2017). The increase in disease burden of infectious disease and malnutrition in Nigeria with the limited resource posed a devastating challenge in diabetes

control (Wolde et al,2020). Also, the surge in morbidity and mortality in Africa has been attributed to undiagnosed diabetes which is two times greater than that of developed countries (Ogurtsova et al, 2017). This upsurge has been linked with unhealthy dietary pattern, lack of physical activities, obesity, and sedentary lifestyle (Kolb, Martin, 2017).

Self-care behaviour in diabetes has been defined as self-motivated and cognitive activities embark on by individuals with diabetes in order to manage the disease on their own (American Diabetes Association Standard Medical Care in Diabetes,2009). There are 7 vital self-care behaviours in people with diabetes; these are monitoring blood glucose, healthy eating, compliance with medication, physical activity, risk-reduction behaviour, healthy coping skills and problem-solving skills (American Diabetes Association Standard Medical Care in Diabetes,2009). Efficacious control of diabetes is reliant on the self-care behaviour of the diabetic patient (Zareban et al, 2014).

Poor self-care behaviour among diabetes patients results to poor glycemic control, increase in complications such as retinopathy, nephropathy, and is the main cause of mortality (Karimy, Koohestani &Araban, 2018). These complications will require time and high medical expenses in order to be treated (Karimy, Koohestani &Araban, 2018). However, appropriate self-care behaviours can reduce diabetes complications by half (Zareban et al, 2014).

One of the factors that promote compliance to self-care practice of diabetes patient is diabetes knowledge. Diabetes knowledge has been reported to be associated with self-care practice and glycemic control (Smalls et al,2012). Patients who are knowledgeable about their condition are more likely to practice self-care behaviour in order to manage their disease condition (Smalls et al,2012).

Furthermore, diabetes health literacy has been shown to improve self-care practices of diabetic patients (van der Heide et al,2014). A study revealed that poor health literacy is associated with poor diabetes knowledge, poor glycemic control, higher glycated haemoglobin (HbA1c) level and poor physical activity. Also, patient with good diabetes

knowledge were more likely to control glucose level and less likely to smoke (van der Heide et al,2014). In spite of this aforementioned evidence signifying the relationship between knowledge of diabetes and self-care practices of diabetes patient, there are paucity of information on self-care practice of diabetes patients in Oyo state and how it is been influence by knowledge. This study therefore assessed the self-care related knowledge and self-care practices among type 2 diabetic patients attending selected hospitals in Oyo State, Nigeria.

### Materials and Methods

**Design and sample:** This is a hospital based descriptive cross-sectional study. The population consists of type 2 diabetes patient receiving treatment at Adeoyo teaching hospital, State hospital Saki, Moniya general hospital and Adegbite cottage health clinic in Oyo state. One hundred and twenty (120) respondents were conveniently selected for this study. The respondents were selected and involved in the study if they met this inclusion criteria; (1) aged 20 years and greater; (2) living with diabetes for a year or over; and were willing to give informed consent.

### Measures

**Self-care practices questions:** It is a 23-item self-report questionnaire that consists of six sub-domains of diabetes self-care practices. These sub-domains include healthy eating assessed by 4-items (e.g. I include more servings of fruits and vegetables in diet), physical activity assessed by 4-items (e.g. I skip planned physical activity), monitoring blood glucose assessed by 5-items (e.g. I regularly do a self-blood test to monitor my blood sugar level), foot care assessed by 5-items (e.g. I inspect my foot daily), risk reduction behaviour measured by five items (e.g. as long as my blood sugar is in check, I still drink alcohol/smoke), and the final subscale which is compliance with medications was assessed by 5-items (e.g. I only take my medication when my blood sugar level is high). These sub-scales were assessed on a 3-point Likert response scale ranging between 0 and 3. The mean scores of the items were computed to obtain the sub-scale scores for each sub-domain. The sum of the sub-scales creates a composite score for total self-care. An overall internal consistency value ( $\alpha$ ) of .0.90 was obtained for this study.

**Self-care knowledge question:** It is a 13-item questionnaire that assessed self-care related knowledge of the respondents. Each question has a correct response and 2 wrong responses (True, False and Don't Know). One mark was allotted for each correct response and the total probable score for each respondent ranged between 0 and 13 with higher scores reflecting higher self-care related knowledge. Some of the items on the questionnaire include; "Maintaining a healthy weight is not important in management of diabetes", "Monitoring blood pressure is not as important as monitoring blood glucose in a person with diabetes". A Cronbach alpha of 0.82 was obtained for this section.

**Procedure:** Ethical permission was obtained from Babcock University Health Research and Ethic Committee. The clearance letter and the proposal for this study were sent to the chief medical directors of the selected hospitals to sought permission to include the hospital as one of the study locations. Subsequently, the chief medical director gave the permission for the data collection, the type 2 diabetes patients receiving treatment at the outpatient's diabetes unit were approached. The purpose of the study was explained to the patients and those who gave their consents were invited to participate in the study. The questionnaires were giving to those who can read to fill it while those who were not educated were assisted in filling the questionnaire. The entire process took an average of thirty minutes. The completed questionnaires were collected from the respondents on the same day for coding. Participation in the study was voluntary and no incentive was provided. The ethical guidelines regarding the use of human participants in research (such as informed consent, confidentiality, voluntary participation etc.) were strictly followed.

**Data analyses:** Data was analysed using the Statistical Product and Service Solution version 21.0 for Window (IBM SPSS). Descriptive statistics was to generate frequency tables, mean and standard deviation. Secondly, the Pearson correlation was conducted to determine the relationship between the self-care practice and its domains (healthy diet, physical activity, monitoring blood glucose, foot care, risk reduction behaviour and compliance with medications), and self-care related knowledge. All statistical test conducted were two-tailed and at  $p < 0.05$  level of significant. Variables that are significant at  $p$ -value  $< 0.05$  in bivariate analysis were entered in multivariate regression analysis.

## Results

### Respondents' Socio-demographic

**Characteristics:** The respondents mean age was  $61.00 \pm 8.242$  years and more than half 79(65.8%) of the respondents were male. Most 73(60.8%) of the respondents were Yoruba ethnic group. Less than half 58(48.3%) of the respondents had primary education with only a few 3(2.5%) of the respondents with university education.

Half 60(50.0%) of the respondents are fully employed on a full-time basis, as more than half 66(55.0%) of the respondents are self-employed. A good proportion 43(35.8%) of the respondents reported to had been diagnosed between 4- 6 years, while sixty-six had family history of diabetes. (See, Table 1).

**Table 1: Socio-demographic Characteristics of Respondents**

Socio-demographic variables for consideration	Respondents in this Study; N=120	
	Frequency(n)	Percentage (%)
<b>Age (in years) <math>\bar{x}61.00 \pm 8.24</math></b>		
42-47	3	2.5
48-53	16	13.3
54-59	42	35.0

60-65	20	16.7
66-71	23	19.2
72-77	15	12.5
78-83	1	0.8
<b>Gender</b>		
Male	79	65.8
Female	41	34.2
<b>Educational attainment</b>		
Non-Formal	29	24.2
Primary School	58	48.3
Secondary School	30	25.0
University Education	3	2.5
<b>Ethnicity</b>		
Igbo	13	10.8
Yoruba	73	60.8
Hausa	29	24.2
Others	5	4.2
<b>Occupational status</b>		
Employed full Time	60	50.0
Employed Part Time	9	7.5
Currently Unemployed	31	25.8
Retired from Active Employment	20	16.7
<b>Nature of Occupation</b>		
Civil Servant	21	17.5
Business Person/Self Employed	66	55.0
Professional	19	15.8
House Wife	3	2.5
Retired	11	9.2
<b>When was condition diagnosed?</b>		
0-3	37	30.8
4-6	43	35.8
7-9	34	28.3
10-12	6	5.0
<b>Family history of diabetes?</b>		
Yes	66	55.0
No	54	45.0

### Respondents Self-care related Knowledge:

Respondent's self-care knowledge showed a mean score of  $8.05 \pm 2.48$ . Respondents' knowledge was further categorized into low (0-6) and high (7-12). Most 94(78.3%) of the respondents had a high level of self-care knowledge while only a few 26(21.7%) of the respondents had low level of self-care related knowledge (See, Table 2). Respondent's self-care knowledge showed a mean score of  $8.05 \pm 2.48$ . Respondents' knowledge was further categorized into low (0-6) and high (7-12).

Most 94(78.3%) of the respondents had a high level of self-care related knowledge while only a few 26(21.7%) of the respondents had low level of self-care related knowledge (See table 2).

There is a significant relationship between respondent's family history and self-care related knowledge. While there was no significant relationship between respondents age ( $X^2=8.48$ ;  $p=0.21$ ), gender ( $X^2= 0.77$ ;  $p=0.37$ ), educational attainment ( $X^2= 6.42$ ;  $p=0.09$ ), ethnicity ( $X^2 = 2.28$ ;

$p=0.51$ ), occupational status ( $X^2=5.46$ ;  $p=0.14$ ) nature of occupation ( $X^2=3.07$ ;  $p=0.54$ ) and self-related knowledge (See, Table 3).

**Respondents Self-Care Practices:** Regarding self-care practice domains of diabetic patient, majority of the respondents 114(95%) had low physical activities, most of the respondents 102(85%) had unhealthy eating habits, majority of the respondents 116(96.7%) had low monitoring of blood glucose, most of the respondents 87(72.5%) had low compliance with medication, majority of the respondents had low risk reduction behaviour and more than half of the respondents 70(58.3%) had low foot care behaviour. Overall majority of the respondents 113(94.2%) had poor self-care practice (See, table 4).

The result of the correlation analysis showed no significant relationship between self-care related knowledge and self-care practices ( $r = 0.001$ ;  $p =0.994$ ).

The result further showed that patient physical activity was significantly negatively correlated with knowledge ( $r =-0.256$ ;  $p = 0.005$ ), results also showed that foot care is positively correlated with self-care related knowledge ( $r = 0.275$ ;  $p = 0.002$ ). the multiple regression analysis showed that respondents' self-care related knowledge contributed 6% to their physical activity ( $R^2 = 0.06$ ;  $p= 0.005$ ), and 7% to their foot care practices ( $R^2 = 0.07$ ;  $p= 0.002$ ) (See, Table 6)

**Table 2: Knowledge Category of Respondents' About Self-Care Behaviour**

Variable	Respondents in this study; N=120 mean score of 8.05 ± 2.48	
	Frequency	Percentage (%)
<b>Low (0-6)</b>	26	21.7
<b>High (7-12)</b>	94	78.3

**Table 3 Relationship between Respondents Socio-demographic Characteristics and Self-care Knowledge**

Socio-demographic variables for consideration	Knowledge of Self-care n=120		X <sup>2</sup>	p-value
	Low (%)	High (%)		
Age (in years)			8.48	0.21
42-47	1(33.3)	2(66.7)		
48-53	1(6.3)	15(93.8)		
54-59	8(19.0)	34(81.0)		
60-65	4(20.0)	16(80.0)		
66-71	5(21.7)	18(78.3)		
72-77	7(46.7)	8(53.3)		
78-83	0(0)	1(100)		

Gender			0.77	0.37
Male	19(24.1)	60(75.9)		
Female	7(17.1)	34(82.9)		
Educational attainment			6.42	0.09
Non-Formal	9(31.0)	20(69.0)		
Primary School	9(15.5)	49(84.5)		
Secondary School	6(20.0)	24(80.0)		
University Education	2(66.7)	1(33.3)		
Ethnicity			2.28	0.51
Yoruba	2(15.4)	11(84.6)		
Igbo	16(21.9)	57(78.1)		
Hausa	8(27.6)	21(72.4)		
Others	0(0)	5(100)		
Occupational status			5.46	0.14
Employed full Time	12(20.0)	48(80.0)		
Employed Part Time	2(22.2)	7(77.8)		
Currently Unemployed	4(12.9)	27(87.1)		
Retired from Active Employment	8(40.0)	12(60.0)		
Nature of Occupation			3.07	0.54
Civil Servant	6(28.6)	15(71.4)		
Business Person/Self Employed	12(18.2)	54(81.8)		
Professional	6(31.6)	13(68.4)		
House Wife	0(0)	3(100)		
Retired	2(18.2)	9(81.8)		
When was your condition diagnosed?			15.47	0.16
0-3	8(24.1)	29(75.8)		
4-6	5(31.7)	38(68.3)		
7-9	11(19.1)	23(80.9)		
10-12	2(40.0)	4(60.0)		
Do you have a family history of diabetes?			10.57	0.001
Yes	7(10.6)	59(89.4)		
No	19(35.2)	35(64.8)		

**Table 4: Respondents Self-Care Practices**

Self-care sub-domain	Low (%)	High (%)	Mean
Physical activities	114(95.0)	6(5.0)	4.13±1.36
Healthy eating	102(85.0)	18(15.0)	4.96±1.55
Blood glucose monitoring	116(96.7)	4(3.3)	4.09±1.73
Compliance with medication	87(72.5)	33(27.5)	5.92±3.31
Risk reduction behaviour	93(77.5)	27(22.5)	6.31±1.96

<b>Foot care behaviour</b>	70(58.3)	50(41.7)	7.21±2.55
<b>Overall Self-care behaviour</b>	113(94.2)	7(5.8)	32.6±6.24

**Table 6 Multiple Regression showing the association between self-care related knowledge and self-care sub-domain**

Variables	Self-care related Knowledge				
	R <sup>2</sup>	Beta	t-value	F-value	p-value
<b>Physical activity</b>	0.06	0.25	2.88	8.29	0.005
<b>Foot care</b>	0.07	0.27	6.43	9.68	0.002

However, self-care related knowledge is not correlated with compliance to medication ( $r = -0.021$ ;  $p = 0.82$ ); glucose monitoring ( $r = -0.12$ ;  $p = 0.176$ ), risk reduction ( $r = 0.035$ ;  $p = 0.760$ ), and healthy eating ( $r = 0.087$ ;  $p = 0.347$ ) (See, Table 5).

**Table 5 Relationship between Self-care related knowledge and Practice of Self-care**

Variable	Self-care related Knowledge N=120	
	r	p-value
<b>Self-care</b>	0.001	0.994
<b>Physical activities</b>	-0.256	0.005
<b>Healthy eating</b>	-0.087	0.347
<b>Glucose Monitoring</b>	-0.12	0.176
<b>Compliance to medication</b>	-0.021	0.82
<b>Risk reduction</b>	0.035	0.70
<b>Foot care</b>	0.275	0.002

## Discussion

This study assessed the self-care related knowledge and self-care practices among type 2 diabetic patients attending selected hospital in Oyo State, Nigeria. The findings from this study revealed respondents mean age as 61 years with a SD of 8.242. The ages of the respondents were between 42-82 years, with the majority of respondents between the ages 54-59 years. This is similar with IDF, (2011) which reported that majority of people with diabetes are within the ages 40-59 years. The present study showed higher diabetes prevalence in men than in women. This report conforms to findings of King et al, (1998) who reported that higher prevalence of diabetes among men. The study showed that male constituted 65.8% of the study population while female was 34.2% of the study population. This gender distribution was at variance to other studies (Adibe, Aguwa, &Ukwe, 2011; Adisa, Fakeye , & Fasanmade, 2011). The current study showed that 35.8% of the respondents reported to have been diagnosed with diabetes for a period of 4-6 years while only 5.0% of the population had it for a period of 10 years and above. This may be associated with current changes in lifestyle and dietary habits (Hassan & Al-Mousa, 1995). The result also showed that more than half of the respondents reported family history of diabetes, hence their good knowledge of type 2 diabetes.

Furthermore, this study showed that respondents had a good self-care related knowledge. The good knowledge reported by the respondents may be due to the fact that 55% of the respondents reported that their family has a history of diabetes giving them some idea about the illness. This report conforms to Saleh et al, (2012) who reported an association between family history of diabetes and good self-care behaviour. However, this finding is at variance with the results of studies conducted in Asian (Al-Maskari et al, 2013; Demaio et al, 2013; Islam et al , 2015). This difference reported could be because respondents of this present study had a good knowledge of diabetes as a result of family history of such ailment hence translated to good self-care related knowledge.

The mean knowledge score of the respondents about self-care behaviour was  $8.05 \pm 2.48$  of the

maximum possible score of 12. The high score could be attributed to the respondent's level of education and a high report amongst the respondents of family history of diabetes. This result corroborated the finding of Niroomand et al, (2016). However, Upadhyay et al, (2012) reported poor self-care related knowledge. There was no correlation between respondents' self-care related knowledge and self-care behaviour. This suggests that knowledge alone does not necessarily translate to good practices, but other variables also account for practice. Also, Toobert et al, (2000)<sup>26</sup> reported similar finding that diabetic patients' knowledge and practice were not significantly related to their self-care management. In contrast to our findings, Ghannadi et al, (2016) reported a significant relationship between patients' knowledge and self-care practice.

Our finding revealed a negative correlation between self-care related knowledge and physical activities, and also a positive correlation between self-care related knowledge and foot care behaviour. This supports the findings of Nuworza et al, (2017) that diabetes knowledge significantly and positively predicted diet, blood sugar testing and foot-care practices. Also, van der Heide et al, (2014) finding was similar to our finding that domain specific diabetes self-care behaviour was associated with self-care related knowledge. This study revealed that majority of the respondents had poor self-care practices which corroborates the studies conducted in Ethiopia, and Kenyan (Mamo, & Demissie, 2016; Berhe et al, 2017). This implies that despite the high level of self-care related practice it does not translate to practice.

**Conclusion:** Respondents had high level of self-care related knowledge, while self-care practices of the respondents were poor. This high level of knowledge did not translate to their self-care practice. It is recommended that healthcare providers should lay more emphasis on practical aspects of self-care practices. Also counselling program by the doctors or nurses should focus on the need for proper self-care practice by diabetic patients.

**Acknowledgments:** The authors thank the participants and the hospitals that participated in the study.

## References

- Adibe M.O, Aguwa C.N, Ukwe C.V. (2011) The construct validity of an instrument for measuring type 2 diabetes self-care knowledge in Nigeria. *Tropical Journal of Pharmaceutical Research* 10.
- Adisa, R., Fakeye, T., & Fasanmade. (2011). A Medication adherence among ambulatory patients with type 2 diabetes in a tertiary healthcare setting in southwestern Nigeria. *Pharmacy Practice (Granada)*,9(2):72-81
- Al-Maskari, F., El-Sadig, M., Al-Kaabi, J., Afandi, B., Nagelkerke, N., Yeatts, K. (2013). Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. *PLoS One*,8(1), e52857.
- American Diabetes Association Standards of Medical Care in Diabetes (2009). *Diabetes Care*. 32(Suppl 1):S13–S61.
- Berhe, K., Gebru, H., Kahsay, H., & Kahsay, A. (2014). Assessment of self-care management and its associated factors among type 2 diabetic patients in Mekelle and Ayder referral hospitals, Ethiopia. *Journal Diabetes Metabolic*,5:378. doi: 10.4172/2155-6156.100037
- Demaio, A., Dugee, O., de Courten, M., Bygbjerg, I., Enkhtuya, P., & Meyrowitsch, W. (2013). Exploring knowledge, attitudes, and practices related to alcohol in Mongolia: a national population-based survey. *BMC Public Health*,13:178.
- Ghannadi, S., Amouzegar, A., Amiri, P., Karbalaefar, R., Tahmasebinejad, Z., & Kazempour-Ardebili, S. (2016). Evaluating the Effect of Knowledge, Attitude, and Practice on Self-Management in Type 2 Diabetic Patients on Dialysis. 3730875 doi: 10.1155/2016/3730875
- Hassan, A., & Al-Mousa, Z. (1995). Prevalence of obesity in patients attending diabetic care centres in Kuwait. *International Diabetes Digest*,6:39-41.
- International Diabetes Federation. *IDF Diabetes Atlas*, 8th ed. Brussels, Belgium: International Diabetes Federation; 2015
- International Diabetes Federation. *IDF Diabetes Atlas*, 8th ed. Brussels, Belgium: International Diabetes Federation; 2020
- International Diabetes Federation. *IDF Diabetes Atlas*, 8th ed. Brussels, Belgium: International Diabetes Federation; 2011
- International Diabetes Federation. *IDF Diabetes Atlas*, 9th ed. Brussels, Belgium: International Diabetes Federation; 2019
- International Diabetes Federation. *IDF Diabetes Atlas*, 8th ed. Brussels, Belgium: International Diabetes Federation; 2017
- Islam, S. M., Biswas, T., Bhuiyan, F. A., Mustafa, K., & Islam, A. (2017). Patients' perspective of disease and medication adherence for type 2 diabetes in an urban area in Bangladesh: a qualitative study. *BMC Research Notes*, 10(1), 131. <https://doi.org/10.1186/s13104-017-2454-7>
- Karimy, M., Koohestani, H.R. & Araban, M. (2018). The association between attitude, self-efficacy, and social support and adherence to diabetes self-care behavior. *Diabetology & Metabolic Syndrome*, 10(1), 86. <https://doi.org/10.1186/s13098-018-0386-6>
- King, H., Aubert, R., Herman, W. (1998). Global burden of Diabetes, 1995–2025. *Diabetes Care*, 21(9):1414-1431.
- Kolb, H., & Martin, S. (2017). Environmental/lifestyle factors in the pathogenesis and prevention of type 2 diabetes. *BMC medicine*, 15(1), 131. <https://doi.org/10.1186/s12916-017-0901-x>
- Mamo M, & Demissie M. (2016). Self-Care practice and its associated factors among diabetic patients in Addis ababa Public Hospitals, cross-sectional study. *Journal of Diabetes and Metabolism*, 7:6(Suppl) <http://dx.doi.org/10.4172/2155-6156.C1.046>.
- Niroomand M, Ghasemi SN, Karimi-Sari H, Kazempour-Ardebili S, Amiri, P., & Khosravi, H. (2016). Diabetes knowledge, attitude and practice (KAP) study among Iranian in-patients with type-2 diabetes: a cross-sectional study. *Diabetes Metabolic Syndrome* 2016(1 suppl): S114-119
- Nuworza, K., Kwaku, O., & Korkor A. (2017). Illness perception, diabetes knowledge and self-care practices among type-2 diabetes patients: a cross-sectional study. *BMC Research Notes* 381
- Odeyinka, O., & Ajayi, I. (2017). Prevalence of hypertension and diabetes and their determinants among commercial drivers in Ibadan metropolis, South-Western Nigeria. *Nigerian Journal of Cardiology*, 14, 75 - 83. [https://doi.org/10.4103/njc.njc\\_11\\_17](https://doi.org/10.4103/njc.njc_11_17)
- Ogurtsova, K., da Rocha Fernandes, J.D., Huang, Y., Linnenkamp, U., Guariguata, L., Cho, N.H., et al. (2017) *IDF Diabetes Atlas: Global Estimates for the Prevalence of Diabetes for 2015 and 2040. Diabetes Research and Clinical Practice*, 128, 40-50. <https://doi.org/10.1016/j.diabres.2017.03.024>
- Rasaki, S.O., Kasali, F.O., Biliaminu, S., Odeigah, L., Sunday, A.A., Sule, A., & Musah, Y. (2017). Prevalence of diabetes and pre-diabetes in Oke-Ogun region of Oyo State, Nigeria. *Cogent Medicine*, 4(1). <https://doi.org/10.1080/2331205X.2017.1326211>
- Saleh, F., Afnan, F., Ara, F., Mumu, S.J., & Khan, A.A. (2017). Diabetes Education, Knowledge Improvement, Attitudes and Self-Care Activities among Patients with Type 2 Diabetes in

- Bangladesh. *Jundishapur Journal of Health Sciences*, 9(1), e36058. doi: 10.17795/jjhs-36058
- Smalls, B. L., Walker, R. J., Hernandez-Tejada, M. A., Campbell, J. A., Davis, K. S., & Egede, L. E. (2012). Associations between coping, diabetes knowledge, medication adherence and self-care behaviors in adults with type 2 diabetes. *General Hospital Psychiatry*, 34, 385–389. doi:10.1016/j.genhosppsych.2012.03.018
- Toobert, D., Hampson, S., & Glasgow, R. (2000). The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. *Diabetes Care*, 23(7): 7, 943–950.
- Upadhyay, D., Mohammed, I., Vijay, M., Mishra, P., & Subish, P. (2012). Evaluation of knowledge, attitude and practice of newly diagnosed diabetes patients—a baseline study from Nepal. *International Journal of Pharmacy Teaching and Practices*, 3(2): 245–252
- van der Heide, I., Uiters, E., Rademakers, J., Struijs, J., Schuit, A. & Baan, C. (2014). Associations among health literacy, diabetes knowledge, and self-management behavior in adults with diabetes: results of a Dutch cross-sectional study. *Journal of Health Communication*, 19(Suppl):115–31
- Wolde, H. F., Derso, T., Biks, G. A., Yitayal, M., Ayele, T. A., Gelaye, K. A., Demissie, G. D., Azale, T., Misganaw, B., Kebede, A., Teshome, D. F., Dellie, E., Gebremedhin, T., & Atnafu, A. (2020). High Hidden Burden of Diabetes Mellitus among Adults Aged 18 Years and Above in Urban Northwest Ethiopia. *Journal of diabetes research*, 2020, 9240398. <https://doi.org/10.1155/2020/9240398>
- Zareban, I., Karimy, M., Niknami, S., Haidarnia, A., & Rakhshani, F. (2014). The effect of self-care education program on reducing HbA1c levels in patients with type 2 diabetes. *Journal of Education and Health Promotion*, 3(1), 123. <https://doi.org/10.4103/2277-9531.145935>