IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 9 Ser.6 (September. 2020), PP 07-16
www.iosrjournals.org

The Impact of Diabetes Mellitus on the Socio-economic and Quality of Life Indices of Selected Patients in Akwa Ibom State, Nigeria.

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Abstract
Background: *The prevalence of Diabetes Mellitus (DM) worldwide and especially in developing countries has been increasing. Apart from the well documented health impacts of DM, the quality of life of diabetic patients has been found to be lower than that of the general populationin four main domains including physical health, psychological, social and economic domains.*
Aims: This study aimed to elucidate on the socio-economic and quality of life indices of selected DM patients who reported at theTeaching Hospital in Akwa Ibom state, Nigeria.
Methods: *A cross sectional study design was used to study a sample of 200 DM patients managed at the University of Uyo Teaching Hospital (UUTH). A structured, pre-validated questionnaire was used in addition to the WHO BREF quality of life assessment instrument to collect data over a 3-monthsperiod. In addition to this, a checklist was used to carry out a market survey, in order to estimate the monthly cost of antidiabetic drugs to a patient, the food security situation in Akwa Ibom state (2018) and the minimum wage in the country.*
Results: *The number of males and females that participated in this study were 75(37.5%) and 125(62.5%) respectively. About half of the respondents experienced at least a moderate amount of physical pain that prevented their daily activities. Majority (44.0%)rated their quality of life as good, while 33.5% rated it as neither good nor bad. Most respondents reported at least moderate satisfaction with their health, and enjoyed their life at least moderately. Majority of the respondents were at least satisfied with their support system, personal relationships and their sex life. Regarding having enough money to meet their monthly needs, only 7.5% reported having enough and 17% reported 'mostly enough'. Most households in Uyo metropolis were seen to be food insecure (89.9%).The market survey revealed that the average cost of each anti-diabetic drugs per patient per month ranged from ₦1,900 to ₦7000.*
Conclusion: *DM significantly impacts the health, psychological, social and financial aspects of patients' lives and these must be considered in the management of DM and in the creation of health policies that could ameliorate them in order to encourage patients' compliance with medications and diet therapy, thus potentially reducing diabetes-related complications, co-morbidities and mortality in view of the large population affected*
Key words*: Diabetes mellitus (DM), physical health, social impact, psychological effect, economic burden.*

Date of Submission: 04-09-2020 Date of Acceptance: 19-09-2020

I. Introduction

It is well documented that the prevalence of diabetes mellitus (DM) has been on the increase in both developed and developing countries over the last three decades This situation has been linked to the changes in dietary habits towards high energy dense foods/animal protein intake with reduction in fruits and vegetables intake among others, as well as increased sedentariness and the lack of adequate physical activity [1,2]. The global prevalence of DM doubled from 4.7% in 1980 to 9.3% in 2019, with a faster rate of increase in low- and middle-income countries[1]. According to the 9th edition of IDF Atlas, at 2.7 million people, Nigeria had the second highest number of people living with diabetes in the African region, after South Africa[1]. A systematic review done in Nigeria reported a 5.7% prevalence of diabetes mellitus, with the highest prevalence in the south-south zone [3].

For chronic diseases such as diabetes mellitus, their severity, presence of complications, their effect on everyday functioning and their cost implications affect the quality of life of not only the patients but also their

families and dependents. The quality of life of diabetic patients is generally reduced regardless of gender and socioeconomic class, further worsened by the presence of microvascular and macrovascular complications [4]. A study carried out in 2006 reported that the health related quality of life (HR-QoL) of patients with diabetes was negatively impacted, especially in physical dimensions such as physical function, bodily pain, general health and vitality, however, it reported that their mental health and social function were not affected [5]. A recent study however found that diabetes greatly affects mental health of individuals, necessitating psychological care and support [4]. Another study reported that type II diabetic patients were 2.5 times more likely to experience functional health impairment, and this was further worsened by cardiovascular and locomotory morbidities [6].

Diabetes mellitus has been established to have social implications; affecting individual relationships and having economic implications. Apart from the five-fold increase in odds of reporting a poorer quality of life among diabetics, a longitudinal study reported that diagnosis of diabetes was associated with a reduction in time spent with family and friends, attendance at social gatherings and in the number of people outside the home that the participants felt they could rely on [7]. These could have negative effects on the mental health of diabetics.Other studies have found that incidence of diabetes was associated with lower marital quality, especially among spouses who tried to influence a patients diet and exercise routine[8,9], or where there was associated sexual dysfunction [10].The economic implications of diabetes mellitus are harrowing, especially in developing countries. The current world-wide diabetes-related health expenditure was estimated to be USD 760 billion in adults aged 20–79 years in 2019 [11],withUSD9.5 billion of these being spent in Africa [1].

The economic burden of diabetes is multi-fold: cost to individuals and their families, cost to the health care sector and indirect costs to the society and government in form of productivity costs; and intangible costs [12,13]. It has been opined that measuring the economic impact of diabetes by focusing on money may not explain the true picture, shifting the focus to other parameters like the individuals' or family's ability and responsibility for payments gives a more realistic outlook on the economic implications of diabetes [11]. For example, a study that evaluated the cost of treating uncomplicated diabetic foot ulcer in several countries in which costs were interpreted as days of labour reported that the costs were equivalent of 6 days of average income in the United States of America and 127 days (4.2months)of average income in India[14].

In Nigeria, unlike tuberculosis, malaria and HIV/AIDS, there is currently little or no support or financial protection for patient with diabetes and other communicable diseases, who are left to pay out of pocket as is prevalent in Nigeria[15]. Consequently, diabetic patients with health insurance have higher quality of life compared to those without health insurance[16]. A study in South-east Nigeria reported the monthly cost of treating diabetes to be ₦56,245 ($356) with diabetic diet taking a larger proportion of this expenditure (₦28,524 i.e. $181) [15]. Studies on the health and socio-economic implications of diabetes mellitus are scarce in Nigeria, and especially in Akwa Ibom state. This study therefore aims to elucidate on the socio-economic and quality of life impacts of DM on patients who attended the endocrinology clinic of University of Uyo Teaching Hospital (UUTH), Uyo between April and June 2016, with additional information on the costs of medication and special diet, when the current food insecurity and minimum wage situation in Nigeria is taken into account.

II. Methodology

Study location: The study was conducted at the Endocrinology clinic of the University of Uyo Teaching Hospital, Uyo. The hospital is a tertiary centre that provides health services for Akwa Ibom State, one of the 36 States in Nigeria. The hospital also receives referrals from towns and villages in the neighbouring states. It is a 500-bed hospital with 21 clinical departments[17]. Akwa Ibom is located in the South-South geopolitical zone of Nigeria, lying between latitudes 4°32′N and 5°33′N, and longitudes 7°25′E and 8°25′E [18].

Study Design: Cross sectional observational study

Study duration: April 2016 to June 2016. A checklist was used to carry out a market survey on current cost of common diabetic medications per month in Akwa Ibom state between August and September 2020.

Sample size: 200 participants

Sample Size calculation

The minimum sample size was calculated as follows:

$n = Z^2pq/ d^2$, where:

n = minimum sample size,

p = prevalence of factor under study (prevalence of poor quality of life =13.1% [19] =0.131).

q = 1- p = 1 – 0.131 = 0.869,

Z = 1.96;

d= degree of precision = 0.05.

Therefore:

$n = 1.96^2 \times 0.131 \times 0.869 / 0.05^2 = 175$

This was increased to 200 to allow for attrition.

Instrumentation

A structured self-administered questionnaire was used, which was an adaptation of the WHO-quality of life assessment questionnaire. It assessed the following:

Section A: sociodemographic characteristics of respondents. Section B: Assessment of physical health of patients. Section C: assessment of psychological effect on respondents. Section D: assessment of effect on social relationships of respondents. Section E: assessment of finances of respondents.

A checklist was also used by a previously trained medically qualified research assistant to collect information on the cost of common diabetic medications vis a vis the minimum wage in Nigeria. An attempt was made to relate these to the food security situation findings of our previous study and infer the possible impact on compliance with both diabetic dietary advice and patients' ability to sustain the use of the prescribed medication.

Sample selection

Respondents were selected by means of random sampling method. Alternate patients who met the inclusion and exclusion criteria and gave consent were enrolled in the study until the desired sample size was reached.

Inclusion criteria

(a) Initially diagnosed withdiabetes mellitus who met the WHO criteria for diagnosis
(b) Patients above 18 years of age
(c) Established disease for at least 1 year.

Exclusion criteria

(a) Unstable patients with probable need for hospital admission.

Ethical consideration

A letter of ethical clearance was obtained from the Health Research Ethical Committee of the University of Uyo Teaching Hospital (UUTH), Uyo. Permission was also obtained from the department of Internal Medicine and the Endocrinology unit of UUTH. Informed and voluntary consent was obtained before questionnaires were administered. Participants were not asked to for any means of identification in order to ensure confidentiality, but were given coded means of identification.

Data analysis

Data gathered was collated, coded and entered, grouped and subjected to analysis using SPSS statistical package version 20. The results were presented in frequencies and percentages. Inferential statistics was tested using chi square and fisher's exact. All relationships were tested at 0.05 level of significance and descriptive statistics presented by use of tables.

III. Result

Sociodemographic characteristics of respondents

200 diabetics participated in this study, with 75 (37.5%) males and 125 (62.5%) females. Majority were within 51-65 years (50.0%), had tertiary education (41.0%) and were married (76.5%). (Table 1).

Table 1: Distribution of respondents by their socio-demographic characteristics

Sociodemographic characteristic	Frequency N=200	Percentage (%)
Age (years)		
18-35	15	7.5
36-50	61	30.5
51-65	100	50.0
≥66	24	12.0
Gender		
Male	75	37.5
Female	125	62.5
Highest educational level		
No formal education	6	3.0
Primary	49	24.5
Secondary	63	31.5
Tertiary	82	41.0
Marital status		
Single	8	4.0
Married	158	79.0
Separated/divorced	5	2.5
Widowed	29	14.5

Physical health of respondents

Table 2 showed that there was no significant difference in physical health of respondents across gender. More female respondents (22.4%) said physical pain prevented them from carrying out their daily activities 'very much' compared to males (14.5%), and were dissatisfied with their ability to perform their daily activities (21.6% vs 14.7% in males).

Table 2: Distribution of physical health parameters of respondents by their gender

	Male n=75 (37.5%)	**Female n=125 (62.5%)**	**Total n=200 (100.0%)**	**Test statistic/p value**
To what extent do you feel that physical pain prevents you from doing what you need to do?				
Not at all	15 (20.0)	30(24.0)	45(22.5)	
A little	24(32.0)	31(24.8)	55(27.5)	$\square^2$= 3.093; p>0.05
Moderate amount	21(28.0)	29(23.2)	50(25.0)	
Very much	11(14.7)	28(22.4)	39(19.5)	
An extreme amount	4(5.3)	7(5.6)	11(5.5)	
How much do you need any medical treatment to function in your daily life?				
Not at all	2(2.7)	4(3.2)	6(3.0)	Fisher's exact= 4.247; p>0.05
A little	10(13.3)	20(16.0)	30(15.0)	
Moderate amount	33(44.0)	50(40.0)	83(41.5)	
Very much	24(32.0)	48(38.4)	72(36.0)	
An extreme amount	6(8.0)	3(2.4)	9(4.5)	
Do you have enough energy for everyday life?				
Not at all	3(4.0)	12(9.6)	15(7.5)	Fisher's exact= 2.701; p>0.05
A little	18(24.0)	23(18.4)	41(20.5)	
Moderately	31(41.4)	51(40.8)	82(41.0)	
Mostly	11(14.6)	18(14.4)	29(14.5)	
Completely	12(16.0)	21(16.8)	33(16.5)	
How well are you able to get around?				
Very poor	2(2.7)	6(4.8)	8(4.0)	Fisher's exact= 3.220; p>0.05
Poor	9(12.0)	14(11.2)	23(11.5)	
Neither poor nor good	13(17.3)	22(17.6)	35(17.5)	
Good	43(57.3)	64(51.2)	107(53.5)	
Very good	8(10.7)	19(15.2)	27(13.5)	
How satisfied are you with your ability to perform your daily activities?				
Very dissatisfied	2(2.7)	5(4.0)	7(3.5)	
Dissatisfied	11(14.7)	27(21.6)	38(19.0)	Fisher's exact= 0.824; p>0.05
Neither satisfied nor dissatisfied	16(21.3)	27(21.6)	43(21.5)	
Satisfied	39(52.0)	50(40.0)	89(44.5)	
Very satisfied	7(9.3)	16(12.8)	23(11.5)	
How satisfied are you with your capacity to work?				
Very dissatisfied				
Dissatisfied	2(2.7)	7(5.6)	9(4.5)	Fisher's exact= 4.845; p>0.05
Neither satisfied nor dissatisfied	20(26.7)	34(27.2)	54(27.0)	
Satisfied	7(9.3)	23(18.4)	30(15.0)	
Very satisfied	40(53.3)	49(39.2)	89(44.5)	
	6(8.0)	12(9.6)	18(9.0)	

A higher proportion of respondents 66 years and above (16.7%) reported that they required an 'extreme amount' of medical treatment to function daily, compared to other age groups ($p<0.05$). No other statistically significant difference was noted in the association between physical health of respondents and their age groups ($p>0.05$).

Table 3: Distribution of physical health parameters of respondents by their age

	20-35 years n=15 (7.5%)	**26-50 years n=61 (30.5%)**	**51-65 years n=100 (50.0%)**	**≥66 years n=24 (12.0%)**	**Test statistic/ p value**
To what extent do you feel that physical pain prevents you from doing what you need to do?					
Not at all	3(20.0)	18(29.5)	18(18.0)	6(25.0)	
A little	7(46.7)	11(18.0)	29(29.0)	8(33.0)	Fisher's exact= 19.600; p>0.05
Moderate amount	2(13.3)	15(24.6)	27(27.0)	6(25.0)	
Very much	3(20.0)	9(14.8)	24(24.0)	3(12.5)	
An extreme amount	0(0.0)	8(13.1)	2(2.0)	1(4.2)	

How much do you need any medical treatment to function in your daily life?					
Not at all	1(6.7)	2(3.3)	3(3.0)	0(0.0)	
A little	2(13.3)	9(14.8)	15(15.0)	4(16.7)	Fisher's
Moderate amount	7(46.7)	24(39.3)	43(43.0)	9(37.5)	exact=
Very much	5(33.3)	22(36.1)	38(38.0)	7(29.2)	14.112;
An extreme amount	0(0.0)	4(6.6)	1(1.0)	4(16.7)	p<0.05
Do you have enough energy for everyday life?					
Not at all	0(0.0)	5(8.2)	7(7.0)	3(12.5)	Fisher's
A little	2(13.3)	12(19.7)	21(21.0)	6(25.0)	exact=
Moderately	8(53.3)	25(40.9)	43(43.0)	6(25.0)	9.146;
Mostly	2(13.3)	6(9.8)	15(15.0)	6(25.0)	p>0.05
Completely	3(20.0)	13(21.3)	14(14.0)	3(12.5)	
How well are you able to get around?					
Very poor	0(0.0)	1(1.6)	5(5.0)	2(8.3)	Fisher's
Poor	1(6.7)	9(14.8)	9(9.0)	4(16.7)	exact=
Neither poor nor good	3(20.0)	14(23.0)	15(15.0)	3(12.5)	7.222;
Good	9(60.0)	25(40.9)	58(58.0)	15(62.5)	p>0.05
Very good	2(13.3)	12(19.7)	13(13.0)	0(0.0)	
How satisfied are you with your ability to perform your daily activities?					
Very dissatisfied	1(6.7)	2(3.3)	4(4.0)	0(0.0)	Fisher's
Dissatisfied	3(20.0)	9(14.8)	19(19.0)	7(29.2)	exact=
Neither satisfied nor dissatisfied	4(26.7)	19(31.1)	15(15.0)	5(20.8)	3.227;
Satisfied	6(40.0)	22(36.1)	50(50.0)	11(45.8)	p>0.05
Very satisfied	1(6.7)	9(14.8)	12(12.0)	1(4.2)	
How satisfied are you with your capacity to work?					
Very dissatisfied	1(6.7)	2(3.3)	6(6.0)	0(0.0)	
Dissatisfied	3(20.0)	15(24.6)	25(25.0)	11(45.8)	Fisher's
Neither satisfied nor dissatisfied	1(6.7)	12(19.7)	14(14.0)	3(12.5)	exact=
Satisfied	9(60.0)	24(39.3)	47(47.0)	9(37.5)	2.054;
Very satisfied	1(6.7)	8(13.1)	8(8.0)	1(4.2)	p>0.05

Psychological effect of diabetes mellitus

As shown in table 4, majority of the respondents (44.0%) rated their quality of life as good, while 4.5% rated it as very poor. More females compared to males rated their quality of life as very poor (6.4% vs 1.3%). There was however not statistically significant (p>0.05). a significantly higher percentage of females picked 'not at all' when asked if they were able to accept their bodily appearance (14.4%) compared to 2.4% of males, however, majority of the respondents (32.5%) picked 'mostly' (p<0.05).

Table 4: Distribution of psychological effect of diabetes on respondents on gender

	Gender		**Total N=200 (100.0%)**	**Test statistics/ p value**
	Male n=75 (37.5%)	**Female n=125(62.5%)**		
How would you rate your quality of life?				
Very poor	1(1.3)	8(6.4)	9(4.5)	
Poor	8(10.7)	12(9.6)	20(10.0)	Fisher's exact=
Neither poor nor good	26(34.6)	41(32.8)	67(33.5)	3.237; p>0.05
Good	35(46.7)	53(42.4)	88(44.0)	
Very good	5(6.7)	11(8.8)	16(8.0)	
How satisfied are you with your health?				
Very dissatisfied	1(1.3)	5(4.0)	6(3.0)	
Dissatisfied	23(30.7)	45(36.0)	68(34.0)	Fisher's
Neither satisfied nor dissatisfied	6(8.0)	19(15.2)	25(12.5)	exact=7.709;
Satisfied	44(58.7)	51(40.0)	95(47.5)	p>0.05
Very satisfied	1(1.3)	5(4.0)	6(3.0)	
How much do you enjoy life?				
Not at all	4(5.3)	8(6.4)	12(6.0)	
A little	18(24.0)	27(21.6)	45(22.5)	Fisher's
A moderate amount	30(40.0)	55(44.0)	85(42.5)	exact=1.890;
Very much	23(30.7)	33(26.4)	56(28.0)	p>0.05
An extreme amount	0(0.0)	2(1.6)	2(1.0)	
To what extent do you feel your life to be meaningful?				
Not at all	2(2.7)	5(4.0)	7(3.5)	Fisher's
A little	5(6.7)	12(9.6)	17(8.5)	exact=1.115;
A moderate amount	24(32.0)	41(32.8)	65(32.5)	p>0.05
Very much	39(52.0)	61(48.8)	100(50.0)	

An extreme amount	5(6.7)	6(4.8)	11(5.5)	
Are you able to accept your bodily appearance?				
Not at all	2(2.7)	18(14.4)	20(10.0)	
A little	13(17.3)	22(17.6)	35(17.5)	Fisher's exact= 13.040; p<0.05*
Mostly	23(30.7)	42(33.6)	65(32.5)	
Moderately	21(28.0)	16(12.8)	37(18.5)	
Completely	16(21.3)	27(21.6)	43(21.5)	

Social effects of diabetes mellitus

Most respondents were satisfied with the support system from friends (41.5%), and only 4.5% were very satisfied. There was no significant difference between males and females (p>0.05). in this study, higher proportion of females were very satisfied with their sex life (12.0%), compared to male respondents (2.7%), while 16.0% of males were very dissatisfied with their sex lives in comparison with 6.4% of females. This difference was statistically significant (p<0.05).

Table 5: Social relationships of respondents by their gender

	Gender		**Total N=200 (100.0%)**	**Test statistics/ p value**
	Male n=75 (37.5%)	**Female n=125(62.5%)**		
How satisfied are you with the support system you get from friends?				
Very dissatisfied	6(8.0)	11(8.8)	17(8.2)	Fisher's exact= 0.454; p>0.05
Dissatisfied	16(21.3)	26(20.8)	42(21.0)	
Neither satisfied nor dissatisfied	17(22.7)	32(25.6)	49(24.5)	
Satisfied	33(44.0)	50(40.0)	83(41.5)	
Very satisfied	3(4.0)	6(4.8)	9(4.5)	
How satisfied are you with your personal relationships?				
Very dissatisfied	1(1.3)	1(0.8)	2(1.0)	Fisher's exact=6.044; p>0.05
Dissatisfied	7(9.3)	4(3.2)	11(5.5)	
Neither satisfied nor dissatisfied	15(20.0)	26(20.8)	41(20.5)	
Satisfied	40(53.4)	79(63.2)	119(59.5)	
Very satisfied	12((16.0)	15(12.0)	27(13.5)	
How satisfied are you with your sex life?				
Very dissatisfied	12(16.0)	8(6.4)	20(10.0)	
Dissatisfied	22(29.3)	30(24.0)	52(26.0)	Fisher's exact=12.217; p<0.05*
Neither satisfied nor dissatisfied	12(16.0)	33(26.4)	45(22.5)	
Satisfied	27(36.0)	39(31.2)	66(33.0)	
Very satisfied	2(2.7)	15(12.0)	17(8.5)	
To what extent do you have the opportunity for leisure activities?				
Not at all	12(16.0)	31(24.8)	43(21.5)	Fisher's exact=7.163; p>0.05
A little	19(25.3)	38(30.4)	57(28.5)	
A moderate amount	19(25.3)	27(21.6)	46(23.0)	
Very much	22(29.3)	20(16.0)	42(21.0)	
An extreme amount	3(4.0)	9(7.2)	12(6.0)	

Financial status of respondents

'A little' was the most common option chosen when respondents were asked if they had enough money to meet their needs monthly (33.3%). Only 7.5% respondents replied 'completely', and 10.0% replied 'not at all'. There was no significance difference across between both genders (p>0.05).

Table 6: Financial status of respondents by their gender.

	Gender		**Total N=200 (100.0%)**	**Test statistics/p value**
	Male n=75 (37.5%)	**Female n=125(62.5%)**		
Do you have enough money to meet your medical and other needs monthly?				
Not at all	6(8.0)	14(11.2)	20(10.0)	
A little	17(22.7)	49(39.2)	66(33.3)	Fisher's exact= 8.608; p>0.05
Moderately	30(40.0)	35(28.0)	65(32.5)	
Mostly	15(20.0)	19(15.2)	34(17.0)	
Completely	7(9.3)	8(6.4)	15(7.5)	

Household food security status of respondents in Uyo

As shown in table 8, only 10.1% respondents were food secure, while 89.9% were not. Food security status was found to be significantly related to the marital status, socioeconomic class, household size and household income of the household heads ($p<0.05$ respectively).

Table 8: Distribution of household food security status of household heads in Uyo metropolis by selected socio-demographic characteristics.

Variable	Food secure n=25(10.1%)	Food insecure; n=224(89.9%)			Test statistics; p value
		Without hunger n=66(26.5%)	With moderate hunger n=76(30.5%)	With severe hunger n=82(32.9%)	
Marital status					
Single	7(50.0)	5(35.6)	1(7.2)	1(7.2)	
Married	14(6.9)	53(36.2)	65(32.2)	70(34.7)	χ^2=39.200
Divorced	2(10.5)	5(26.3)	9(47.4)	3(15.8)	P=0.000*
Widowed	2(14.3)	3(21.4)	1(7.1)	8(57.2)	
Socioeconomic class					
Class 1	5(23.8)	9(42.9)	5(23.8)	2(9.5)	
Class 2	14(19.2)	37(50.7)	20(27.4)	2(2.7)	
Class 3	3(5.3)	16(28.1)	11(19.3)	27(47.3)	χ^2=0.522
Class 4	3(3.9)	4(5.3)	26(34.2)	43(56.6)	P=0.000*
Class 5	0(0.0)	0(0.0)	14(63.6)	8(36.4)	
Household size					
1-4	18(12.9)	24(17.3)	51(36.7)	46(33.1)	χ^2=23.700
5-7	3(3.4)	33(37.5)	24(27.3)	28(31.8)	P=0.001*
>7	4(18.2)	9(40.9)	1(4.5)	8(36.4)	
Household income					
<50,000	10(7.3)	19(13.9)	41(29.9)	67(48.9)	
50-100,000	10(10.2)	42(42.9)	34(34.7)	12(12.2)	χ^2=0.310
>100,000	5(35.7)	5(35.7)	1(7.2)	3(21.4)	P=0.000*

*****statistically significant

Note: Reprinted from: Opara DC, Johnson O. Household Food Security among Different Wealth Groups within Uyo Metropolis in Southern Nigeria. Journal of Food Security. 2019;7:1-7 [20].

Cost of common glucose lowering agents

A market survey was done to assess the cost of the common glucose lowering agents in Akwa Ibom. Insulin was found to be the most expensive glucose lowering agent while Metformin was the most affordable.

Table 7: Common glucose lowering agents and their average monthly cost in Akwa Ibom state, Nigeria.

Glucose lowering agent	Monthly cost (₦)
Metformin (Glucophage)	1,900-3,800
Glibenclamide	3,200 -5,100
Rosiglitazone (Avandia)	4,500-5,800
Insulin	5,200 -7000

IV. Discussion

In the present study, we assessed the impact of diabetes mellitus on the socio-economic and quality of life indices on patients. Nearly two thirds of the respondents in this study were above 50 years of age, supporting the fact that prevalence of type II diabetes increases with increasing age [21].

Physical effects of Diabetes Mellitus

The physical health domain measures the impact of diabetes on activities of daily living, dependence on medical substances, a lack of energy for everyday activity, restricted mobility and the capacity to work. About a fifth of the respondents reported feeling very much physical pain which prevented them from doing what they need to do, with more females being affected. Pain in diabetes mellitus can be debilitating, affecting sleep and ability to perform daily activity and is often as a result of diabetic neuropathy [22]. A study reported that type II DM patients had a high risk of having painful symptoms [23]. In the present study, the proportion of males and females who stated that they needed a 'moderate amount' and 'very much' amount of medical treatment to function in their daily lives were high. Polypharmacy is common in chronic diseases like diabetes compared to the general population, because the patients typically require medications for the condition and related or unrelated comorbidities [24]. Among other negative effects, polypharmacy and increased dependence on medications in diabetics have been linked to lower quality of life and high health care costs [25]. Most respondents in the present study reported moderate energy for everyday life. However, a higher proportion or respondents

above 65 reported that they did not have any energy, or had little energy for everyday life. They were also more dissatisfied with their ability to perform their daily activities and their capacity to work. Increasing age is associated with decreasing physical health and performance [26], and when coupled with diabetes, the HR-QoL further decreases.

Psychological effect of Diabetes Mellitus

Psychological distress is common in patients with DM. A significant proportion of patients with DM have been found to have clinical depression [27,28] which in turn affects their quality of life and health outcome. Most respondents in the present study rated their quality of life as good, and about a third rated it as neither poor nor good. This differs from a study in India, where 38% of the respondents had poor HR-QoL [29].Psychological support among diabetics has been found to be consistently inadequate, which may lead to development of psychosocial problems, including depressive disorder [30,31]. People with diabetes are two to three times more likely to have depression and this can be debilitating [31]. The psychological needs of DM patients are especially affected when efforts made to control their metabolic outcomes and limit functional disability fails [30]. In the present study, it was seen that about a third of the respondents were dissatisfied with their current health, with females being more affected. Also, over 25% of respondents in this study replied 'not at all' or 'a little' when asked how much they enjoyed life. The psychological domain also accessed the patient's thoughts about their body image and appearance. In the present study, females had a harder time accepting their bodily appearance compared to males. Body image-related distress in DM has been linked to suboptimal glycaemic control [32], hence further worsening quality of life, and the quality of life of women with DM is generally lower than for men [33,34]. Psychosocial problems in DM can result in poor adherence to medications, reduced quality of life, and lack of interest in managing disease resulting in poor glycaemic control and increased short and long-term complications [30].

Social effects of diabetes mellitus

Social relationships including family, peers and romantic partners are central to the management of DM. Having a good social support system has been consistently associated with better diabetic outcomes [35]. Most respondents in the present study were satisfied with their personal relationships and with the support they got from their friends. A significantly higher proportion of males were 'very dissatisfied' and 'dissatisfied with their sex life compared to females, while more females were very satisfied. However previous studies have shown a high prevalence of sexual dysfunction in women with DM as well as in men. Studies carried out in the Uyo, Nigeria, on the prevalence of sexual dysfunction among diabetic men and women showed a 71.8% prevalence, with about 50% having severe degree of sexual dysfunction for men[28], and a 66.7% prevalence for women [10]. Sexual dysfunction significantly affects the quality of life of individuals, and has been reported to cause a strain in spousal relationships [36]. About half of the respondents in the present study had no or little opportunity for leisure activities. This may further worsen the physical and psychological quality of life of the respondents as enjoyable leisure activities have been associated with psychosocial and physical measures necessary for healthy living [37].

Economic implications of Diabetes Mellitus

Catastrophic health spending is obtained when health care costs are paid out of pocket, there is inability to pay, and absence of prepayment mechanisms to pool financial risk [38], and all three of these are prevalent in Nigeria. When asked if they had enough money to meet their needs monthly, including medical and other needs, more than 40% of the respondents in the present study picked 'not at all' or 'a little', and another 32% picked 'moderately'. This shows a high prevalence of financial disability among the respondents in this study. A study in South-east Nigeria reported an average total expenditure on treatment of diabetes monthly of₦56,245 ($145.2) [15]. The impact of this is further appreciated when compared to the ₦30,000 ($77) minimum wage in Nigeria[39]. A study conducted on 1,004 middle class Nigerians reported an average monthly income of ₦75,000 – ₦100,000 [40]. This implies that middle-class diabetic patients may spend about 56-75% of their income on diabetes-related expenditure alone. The poorest socioeconomic class tend to experience more catastrophic spending than other socioeconomic classes [15].

It has been established that diet therapy is an integral component of diabetes management[41], and consumption of healthy diets come with higher costs compared to regular diets[42].There is high prevalence of food insecurity in Uyo (89.9%), especially among those of low socioeconomic class and low income (table 7), this suggests that with the higher costs of the recommended healthy diets, majority of diabetic patients in Nigeriawould rather consume the staple diet, which is more affordable, but mainly starch based [43] with high glycaemic index and therefore not recommended for a diabetic patient. A study reported an average monthly expenditure of ₦28,524 ($73.6) on diabetic diet alone [15]. The high costs of diabetic drugs also contribute immensely to the economic burden of DM. Table 8 shows the commonly used glucose lowering agents in Nigeria [44,45] and their monthly cost implication. Patients are typically placed on more than one of these drugsas

polypharmacy is common in DM [24] with its attendant cost implication. The presence of comorbidities and the cost of treating them further increases financial burden. The monthly expenditure on medications among diabetics according to a study in South-West Nigeria was reported as ₦6,557 ± ₦4,463 [46]. The least expensive glucose lowering agent in the present study was metformin and it cost ₦1,900–₦3,800 every month, that is ₦63.3–₦127 daily. Other expenditures that DM patients have to incur in relation to diabetes include laboratory tests/investigations, transportation to and from the hospital, cost of self-monitoring of blood glucose, insulin syringe and other disposables as well as cost of physiotherapy and foot care. It is therefore no wonder that only a small percentage of the respondents in the present study could completely meet their financial needs each month.

V. Conclusion

This study demonstrated that DM affects the physical health, psychological health, social relationships and the finances of patients. It illustrated the high economic burden of management of DM on the average Nigerian. It is recommended that management of DM should integrate these four domains in other to achieve an overall good quality of life of diabetic patients. Findings in this study also calls for a re-evaluation of the present health financing policy, making accommodations for policies that will make DM care affordable or even free at the delivery point, and provide a wider coverage of health insurance.

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