Original Article

http://jbrcp.org

2018 Journal Impact Factor: 1.10
Print ISSN: 2636-7378 | Online ISSN: 2651-5865

Economic Burden and Payment Coping Mechanism of Patients with Type 2 Diabetes Attending A Tertiary Health Facility Nnewi, Anambra State

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Article information
Date Submitted: 22/10/2022
Date Accepted: 04/12/2023
Date Published: 12/12 /2023

ABSTRACT

The increasing prevalence rate of diabetes on the African continent may translate into severe economic burden. The burden of diabetes implies significant direct and indirect consequences to patients. This study was conducted to determine the Burden and Payment Coping Mechanisms among Patients with Type 2 Diabetic attending outpatient department of a tertiary health care facility in Nnewi, Anambra State. A cross-sectional descriptive survey design using convenient sampling technique and adapted questionnaires as instrument for data collection was employed for the study. Data was analyzed using descriptive statistics and hypothesis tested using multiple linear regressionat $p<0.05$. Findings showed that an average monthly direct cost of type 2 diabetes was N74, 974.31($254.01) and an indirect cost of N72, 311.19($236.31). Major coping mechanisms utilized by respondents were, patients own money (salary, earnings, savings), payment by family members, sale of lands, gifts from friends and neighbors and skipping of appointments. Employment status, educational qualification and social class were significant predictors of direct cost among patients with diabetics (P-values were 0.015, 0.010, and 0.013 respectively. The economic burden on patients with diabetic is continuously on the increase, patients need financial assistance in order to cope with the cost of their treatment. There is need for government and Non-Governmental agencies to intervene by subsidizing the cost of diabetic management and treatment.

Keywords: Economic burden, Direct cost, Indirect cost, Payment coping mechanism, Diabetes Mellit

INTRODUCTION

Incidence of Diabetes mellitus is expected to rise, with the projection of 629 million worldwide and 41 million in Africa[1]. The developing economies of Africa and Asia contribute a significant fraction of this figure. Currently, sub-Saharan Africa is estimated to have 20 million people with diabetes, about 62% are not diagnosed and the number is expected to reach 41.4 million by 2035 or an increase of 109.1%[2]. It is estimated that, the number of people with Diabetes mellitus worldwide was about 425 million in 2017, in Africa alone about 16 million people are diabetic and in Nigeria about 1.7 million individuals have Diabetes

How to cite this article

Ehwarieme T A*, Uzezi J. Economic Burden and Payment Coping Mechanism of Patients with Type 2 Diabetes Attending a Tertiary Health Facility Nnewi, Anambra State, Nigeria. J Biomed Res Clin Pract: 2023;6(3&4):1-8.
DOI:https://doi.org/10.5281/zenodo.10442303

Access to the article
Website: http://www.jbrcp.org
: DOI: 10.5281/zenodo.10442303

mellitus[1]. Diabetes mellitus (DM) is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both. Insulin deficiency in turn leads to chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism[3].

In sub-Saharan Africa, Nigeria has the highest number of people with diabetes with an estimated 3.9 million people (or an extrapolated prevalence of 4.99%) of the adult population aged 20-79 years. Furthermore, in terms of morbidity, diabetes contributes to the development of heart disease, renal disease, pneumonia, bacteremia, and tuberculosis (TB)[2]. There is also a rising burden from the complications of DM alongside the ever-increasing prevalence of the disease.[4]The number is projected to almost double by 2030[5]. Increases in the overall diabetes prevalence rates largely reflect an increase in risk factors for type 2, notably greater longevity and being overweight or obese[6]. Studies conducted in Nigeria indicated that the prevalence of diabetes ranged from low level of 0.8% among adults in rural highland dwellers to over 7% in urban Lagos with an average of 2.2% nationally[2]. The potential severity of increasing prevalence rate of diabetes on the African continent may be translated into severe economic burden[7].

While the impact of diabetes to society is notable, the economic costs borne by healthcare systems and governments are hugely substantial. The burden of diabetes implies significant direct and indirect consequences to patients. While the direct costs deal with healthcare resource consumption such as medications, outpatient and inpatient costs, the indirect costs largely encompass monetary losses caused by disabilities and deaths, travel expenses, nutrition costs, productivity and income loss[8]. The American Diabetic Association (ADA) placed the cost of diagnosed diabetes in 2017 at $327.2 billion[9].

Undiagnosed diabetes (7.9%, $31.7 billion), prediabetes (10.7%, $43.4 billion), and GDM (0.4%, $1.6 billion) combine with the prior estimate for diagnosed diabetes to total $403.9 billion annually[10]. Diagnosed diabetes accounted for 81.0% of this total[10]. The average economic cost per person was projected to be $13,240 for diagnosed diabetes, $4,250 for undiagnosed diabetes, $500 for prediabetes, and $5,800 for GDM. These estimates included medical expenditures that exceed levels occurring in the absence of diabetes or prediabetes as well as indirect costs due to productivity losses associated with related morbidity and mortality. It is no surprise, then, that medical spending for diagnosed diabetes is among the highest for all conditions[11,12]. In light of these circumstances, increasing access to programs to prevent diabetes, prediabetes, and risk factors associated with these conditions (e.g., obesity, insufficient exercise) becomes even more crucial in developing countries like Nigeria[13], therefore, information about the economic burden of diabetes may become necessary to assess programs and policies implemented to prevent and treat these conditions. Also evidenced-based data is needed to move diabetes mellitus into the national health policy agenda for targeted intervention. Unfortunately, there is paucity of data on the magnitude of the economic burden borne by diabetic patients and payment coping mechanisms in Nigeria especially in Anambra state. This study therefore investigates the economic burden and payment coping mechanisms of diabetic patients attending tertiary health care facility in Anambra State, Nigeria.

MATERIAL AND METHODS

Research Design/setting: A cross sectional descriptive study design was employed for the study at Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, a tertiary federal health institution which provides a wide range of medical, surgical, diagnostic, out-patient, rehabilitative and support services such as Nursing services, Nutrition and Dietetics, Pharmacy, etc. to south eastern Nigeria. The hospital which is a federal teaching hospital boast of staff strength both, medical and non-medical, of about two thousand, seven hundred (2,700) staff.

The target population for this study was all the out patients (700 diabetics patients) who have been receiving treatment for Diabetes Mellitus type 2 in the outpatient department for the last six months (Jan-June 2021) in the health facility, (Health Records Department

2021).

Sample size

The minimum sample size was calculated using the Taro Yamane formula

$n = N/(1+Ne^2)$

where:

n = sample size

N = population size

e = level of precision. (e = 0.05).

$n = N/(1+Ne^2) = \frac{700}{1+700(0.05)^2}$

= 255

With 10% attrition rate, which is 25.5

$n = 255 + 25.5 = 280.5 \sim 281$

Thus 281 diabetic patients were used as the sample.

Sampling Technique: Convenient sampling technique was used to select 281 participants who met the study criteria.

Instrument for data collection: An adapted questionnaire form[14], was used to source information from the participants. The questionnaire was divided into 4 sections (A-D): **Section** A, demographic data; **Section B** consist of questions on the economic burden of diabetic patients (direct costs of accessing diabetes mellitus care and indirect cost of earnings lost as a result of time spent visiting healthcare system and being absent from work. **Section C** dealt with payment coping mechanisms (skipping appointment to avoid costs, use own money (earmarked savings), community-based support, interruption of payment of children's education and others. **Section D** assessed socio-economic status of the diabetes mellitus patients.

Validity/reliability of the Instrument: Face and content validity was ensured by two experts, a consultant endocrinologist and an expert in measurement and evaluation. The questionnaire was pretested on 28 diabeties patients representing 10% of the sample size. Data obtained were analyzed using split half reliability test and the Cronbach's alpha, obtained by sections were 0.82, 0.73 and 0.73 for B,C and D respectively.

Method of data collection/analysis: Three research assistants were trained on the study protocol. The questionnaire were administered within the hours of 8am and 1pm while the patients waited to see their physicians to avoid disruption of daily clinic activities and ensure good attention from patients. Univariate descriptive analysis was employed since the primary purpose was to describe the status of each variable and not to relate them to one another[15]. The direct cost and indirect costs were derived using descriptive statistics. The monetary value of man hour lost was calculated using the Human Capital Approach (descriptive economic method); 8hours a day (40 hours) a week for government workers, 10 hours a day (60 hours) a week for the self- employed and housewives. The wage rate for housewives was estimated at Nigerian minimum wage of #30,000. Analysis were done using descriptive analysis; mean frequency and percentage in table and figure. IBM (International Business Machine Corporation) Statistical Package for Social sciences (SPSS) version 25.0, produced in Chicago, United States of America

The computation of the wage loss is computed using the procedure below:

Patient's Monthly Wage Loss = Average no of days absent from work x daily man-hour (8hours) x monthly earning/Total number of working hour per month (160hours)

Attendant's Monthly Wage Loss = Monthly earning x (Waiting time + Travel time) x No of appointment per month/Total number of working hour per month (160hours)

Percentage Patient Wage Loss = (PMWL/monthly earning) x 100

Percentage Attendant Wage Loss = (AMWL/monthly earning) x 100

Percentage Total Wage Loss = ((PMWL+AMWL)/(sum of monthly earning of patient and attendant)x100.

Ethical Consideration: Ethical clearance was obtained

from the Ethical Committee of Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State (approval number NAUTH/CS/66/VOL.12/180/2019/143.) Informed consents of the patients were obtained and assurance given to them that all information received would be handled confidentially. Participants were informed that participation is voluntary.

RESULTS

Table 1 showed demographic characteristics of respondents. 157 (49.5%) were males, 140 (50.5%) were females. The mean age of the respondents was 65.78years. Majority 267 (96.4%) were married, majority 139 (50.2%) and 118 (42.6%) had senior secondary education.

Table 2 showed that the total average monthly direct cost incurred by the respondents was N74, 974.31

Table 1: Demographic Characteristics of Respondents

	Frequency	Percent
Gender		
Male	137	49.5
Female	140	50.5
Age group (Years)		
<40	8	2.9
40 – 49	49	17.7
50 – 59	146	52.7
≥60 mean 65.78	74	26.7
Marital Status		
Married	267	96.4
Single	10	3.6
Employment Status		
Government employed	76	27.4
Private sector employed	27	9.7
Self employed	139	50.2
Retired	7	2.5
Farming	25	9.0
Housewife	3	1.1
Highest Education Qualification		
Primary	48	17.3
Junior Secondary School	2	0.7
Senior Secondary School	118	42.6
University/College/Polytechnic	64	23.1
Postgraduate education	45	16.2

Table 2: Direct Cost of Diabetes

	Mean	Std. Deviation
1. How long (Years) have you been receiving treatment for diabetes in NAUTH, Nnewi	6.71	4.08
2. **Cost before diagnosis was confirmed as diabetes(₦)**	5450	
3. **Monthly expenditure to take care of diabetes(₦)**	15726.63	9316.69
***c. Laboratory tests*(₦)**	**26916.31**	**2396.92**
d. Consultation Fees		
i. Physician (₦)	791.98	77.64
ii. Other Specialists	-	-
e. Insurance premium and co-payment per visit	-	-
f. Transport to and fro for you and person always accompanying you (₦)	1167.55	554.63
g. Diabetic diet per month (₦)	36102.17	19932.98
h. Self-monitoring of glucose levels (₦)	2970.80	1520.64
i. Insulin syringe and other disposables (₦)	835.00	287.36
j. Extra household helper for diabetes care (₦)	15000.00	0.00
k. Physiotherapy (₦)	3897.78	1203.28
l. Dressings/disposables (₦)	4125.00	1552.65
4. Do you receive treatment elsewhere within the last one year? 11. If yes, please state the costs incurred for your treatment monthly in that place (₦)	10000.00	0.00
How much does it cost you to take care of the condition monthly (₦)	7453.67	12666.67
Total average monthly direct cost (₦)	**74974.31**	

Table 3 showed that the attendant's monthly wage loss is N2, 330.00, patient's month wage loss is N69, 981.13, and Total monthly wage loss is N72, 311.19. The percentage patient wage loss is 31.75% of the patient's monthly earning, percentage attendant wage loss is 2.51%, while the percentage total wage loss is 23.1% of the attendant's monthly earning. The total indirect cost computed from the study is N72, 311.19 which is same as the total wage loss of the patients.

Table 3: Indirect cost of diabetes

	Mean	Std. Deviation
.What is your monthly pay/earnings from your income (N)	220,413.00	194,545.983
.How many days have you been absent from work because of this sickness within the last one month (Days)	6.35	7.74
. What is the monthly earnings of the person that accompanies you for treatment? (N)	92,773.58	40,566.96
.How long does it take you to see your doctor on each appointment date (Hours)	3.24	0.95
.How many minutes does it take you to get to NAUTH Nnewi on appointment days (minutes)	46.71	27.60
.Computation of Wage Loss		
Attendant's Monthly wage loss (AMWL) (N)	2,330.00	
Patient's Monthly Wage Loss (PMWL) (N)	69,981.13	
Total monthly wage loss (TMWL) (N)	72,311.19	
Percentage Patient Wage Loss (%)	31.75	
Percentage Attendant Wage Loss (%)	2.51	
Percentage Total Wage Loss (%)	23.1	
Total average monthly Indirect cost (N)	**72,311.19**	

Table 4 showed payment coping strategies of respondents. Two hundred and seventy-seven (100%) used their own money (salary, earnings, savings), 166 (59.9%) their family member paid, 107 (38.6%) through gifts from friends and neighbors, 32 (11.6%) through sales of lands, 15 (5.4%) by skipping appointments 3 (1.1%) each borrowed money/loan and sales of household mobile assets respectively, , 4 (1.4%) used community based support, 7 (2.5%) through temporary stoppage of children's education, 3 (1.1%) through social welfare/social worker (waiver).

Table 4: Payment coping strategy

Coping strategies	Frequency	Percent
Own money (salary, earnings, savings)	277	100.0
Family member paid	166	59.9
Gift from friends and neighbors	107	38.6
Sale of lands	32	11.6
.Skips appointments	15	5.4
Temporary stoppage of children's education	7	2.5
Community based support	4	1.4
Borrowed money/loan	3	1.1
Sale of household mobile assets	3	1.1
Social welfare/social worker (waiver)	3	1.1

Table 5: showed a multiple linear regression associating socio-demographic characteristics and direct cost of diabetes mellitus patients. It shows that employment status (p=.015), educational qualification (p=.010) and social class (p=.013) were significant predictors of direct cost of diabetes mellitus patients.

Table 5: Multiple linear regression associating socio-demograhic characteristics and direct cost of diabetes mellitus patients

Variables	Coefficients	t	P
(Constant)	82526.844	3.534	.000
Gender	27.130	.010	.992
Age	367.071	.765	.445
Age group (Years)	2641.028	.567	.571
Marital Status	-751.358	-.093	.926
Employment Status	5903.999	2.446	.015
Highest Education Qualification	-6216.778	-2.595	.010
Social Class	-15996.385	-2.501	.013

Note naira equivalent of dollar as at when this researched was conducted was ₦306 per 1US dollar official exchange rate)

DISCUSSION

The findings of this study revealed that the mean direct cost of ₦74,974.31 ($245.01) at ₦306 official exchange rate per US dollar as at the time this study was conducted agrees with the finding reported in Bahrain where a computed monthly direct cost was ₦78,642 ($257)[16]. However, it is higher than ₦56,245 ($183.80) reported in Enugu[17], and ₦52,104.28 ($170.27) reported in Abia both in both in south east Nigeria[14]. The finding from this study deviates from the community-based study in India where a monthly mean direct cost of N1, 586.10 ($5.23) and N2, 945.25 ($9.63) were reported[18,19]. This difference in monthly direct cost can be linked to the geographical location of the study group. India is a fast growing nation that with recent times cannot be compared to Nigeria in terms of development and technological advancement as well as socioeconomic

status. Nigeria is currently experiencing inflation and high rate of depreciation in monetary value when compared to other countries like India. The cost of health care is also well subsidized in India compared to Nigeria where there are no such incentive to health care. No doubt this high expenditure reported in the present study could make the diabetics to cut down consumption of basic needs like food to meet up with payment for diabetic care or skip appointments as long as they feel well but report back when complications set in leading to higher rate of mortality and morbidity among the diabetics patients which is always the case scenario in our tertiary health care facilities in Nigeria. A lot is therefore needed to be in mainstreaming the cost of care of diabetics fully into national health insurance scheme to reduce cost and save life.

Findings from this study showed that the indirect cost incurred by patients and their household were; time taken to see a doctor on days of appointment and time utilized by the patient to get to the hospital on appointment days. The mean indirect cost computed is N72, 311.19 ($236.31). This figure is higher than those reported in India[18,19], Ghana (₦15,270.17) ($49.90)[20], and (₦13,770.00) ($45) in a global systematic review[21]. The mean indirect cost from the finding is lower than (N139, 659.60) ($456.40) reported by Ekpemiro[14]. This difference could be as result of differences in geographical location and high cost of living in the location.

In our study about 6.35 days was lost by patients in a month in the cost of seeking medical care from the disease. This figure doubles the findings in Ghana where patients with complications averagely lost about 3 working days in a month due to absenteeism[20]. Also in this study it took patients 3.24h ours (194.4 minutes) to see a doctor on each appointment date. This figure is close to the waiting time reported in Benin City in a general clinic, where patients reported they spend a mean waiting time of 2.41hours (144.45 minutes) before seeing a medical doctor[22]. Waiting time is an important determinant of quality of services as it is noted that in health care provision, delays are expensive, not only in terms of direct costs incurred, but also in terms of the potential costs of decreased patient satisfaction and adverse outcomes.

To meet the cost of illness, poor households resort to coping strategies that are potentially risky for their future welfare. In this study, payments for diabetes were found to be made mostly through Own money (salary, earnings, savings). This is likely to increase the economic burden of diabetes, especially on the middle class who reported highest among those who use their own money. The findings on payment coping strategies for diabetes are similar to findings in previous studies where individuals fell back on savings earmarked for other needs to cope with healthcare payments[23,24]. Also in agreement with the present findings is the finding reported by Ekpemiro, where the major payment coping mechanisms used were own money (earmarked savings and earnings), behavioral payment coping mechanisms (installment purchase of drugs) and social support (family and friends paid)[14]. Incomes and savings have been reported as popular payment coping mechanisms in Zambia, Cote d'voire, Chad, and an average of 40% of West African countries cope with healthcare payment through them[23]. However, using money saved for other basic items like food as payment coping mechanisms could jeopardize the health of patients and further push them into poverty because total expenditure is inflated and necessary consumption is temporarily sacrificed to pay for healthcare. About 11.6% of the diabetes patients in this study resort to sales of assets in order to cope with the treatment of their condition. This supports the finding of Ekpemiro, who reported that disposal of assets is one of the coping strategies employed by the patients[14]. The findings from this study reported that borrowing as a coping mechanism was observed among about 1.1% of the respondents. Borrowing often attracts a high rate of interest on the loan, especially when they borrow from professional money lenders. About 30% of households in West Africa finance out of pocket spending through borrowing; however, wealthier households are less likely to borrow or sell assets. Diet modification was not a significant coping mechanism in this study and hence the need for health care professionals to enlighten diabetic patients on the need

to modify their diets for healthier living asides taking their medications

The study found out that there is significant association between socio-demographic characteristics and direct cost of diabetes mellitus patients. It showed that the relationship between employment status, educational qualification, social class and direct cost of diabetes mellitus patients was statistically significant (with p-value of (0.015), (0.010), (0.013) respectively). This agrees with the study of findings reported in Ethiopia where employment status, educational qualification, and social class were factors significantly associated with the high cost of hypertension. [25]

CONCLUSION

This study assessed economic burden and payment coping mechanisms of type 2 diabetic patients attending a Tertiary Health Institution in Anambra State. The result shows that the diabetic patients have high economic burden as reported by their direct and indirect medical costs as incurred by patients and their household. Also, that the coping strategy varies by socioeconomic status of the patients, with the lower class reporting highest difficulty in coping.

RECOMMENDATION

Based on the findings from this study, the following recommendations are made: Diabetic patients need financial assistance in order to cope with the cost of their treatment, since majority of them in this study are poor. There is need for government to intervene by subsidizing the cost of diabetic management and treatment. The government and non-governmental agencies need to be involved in diabetic care and management.

Conflict of interest: no conflict of interest declared

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