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## Original Research Article

### The Socio-Economic Impact of Diabetes Mellitus in Imo State, Nigeria

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Abstract	Keywords
<p>A survey was carried out on diabetic patients in Imo State, investigating the socio-economic impact of the disease. A questionnaire was used to evaluate the estimated amount of money spent on drugs, physician services, diagnosis, food supplements and treatment of complications. The patient's levels of education and their estimated monthly income were also investigated to evaluate the financial burden of diabetes mellitus on these patients. Also considered were the prevalence of the disease in relation to age and the extent to which the disease affected the patients' productivity, and government's contribution towards the care and management of the disease. The study confirmed that the disease is prevalent among people aged 60 and above, that 54% of the subject had job limitations as a result of the disease, 44% of the subjects cannot take care of the financial cost of medications considering their monthly income. None of the patients had medical insurance and there were no government policies to cover diabetic patients in Imo state. It is obvious that diabetes mellitus is a serious health problem in Imo state that needs government's attention.</p>	<p>Diabetes mellitus Financial status Health complications Job limitation</p>

### Introduction

For most chronic illness, therapeutic success is traditionally measured by diseases-free and overall survival, and control of major physical symptoms. While these factors play a primary role in such

evaluations, efforts have been made to assess the extent of which chronic diseases and their treatments affect patients' functional capacity, psychological and social health, and overall sense of well-being and

quality of life. Diabetes mellitus is presently of unknown etiology. It is a disorder characterized by high blood glucose level in context of insulin resistance and relative insulin insufficiency. The World Health Organization (WHO) on the basis of laboratory findings defines diabetes mellitus as fasting venous plasma glucose concentration greater than 7.8mmol/l (140mg/dl), greater than 11.1mmol/l (200mg/dl) two hours after an oral ingestion of an equivalent of 75g glucose, even if the fasting concentration is normal.

The human body is an interconnected and a highly intricate network of trillions of cells. One of the many functions of cells is to produce energy for life. For each cell to produce energy, it needs fuel primarily in the form of glucose. The surface of each cell contains docking stations for insulin and glucose. Insulin serves as the key which opens cells receptors for glucose to enter. The glucose transporters carry these glucose molecules to the mitochondrion, where the body ultimately uses it to create energy. As carbohydrate or sugar are absorbed by the cells after a meal and blood sugar increases, insulin is secreted by the pancreas, and circulated throughout the body. As insulin binds to cell receptors, cell absorbs glucose from the blood streams to produce energy and low blood sugar levels. As blood sugar decreases, the pancreas secretes glucagon which breaks down glycogen in the liver and releases additional glucose into the blood streams. The rapid raise in blood sugar causes significant inflammation of the blood vessels lining, when this inflammation spreads to capillaries of the muscles, the vessels tend to constrict and thicken. This creates a physical barrier making it more difficult for insulin in the blood streams to pass through and allow sugar to get into cells results to insulin resistance. Insulin resistance when left untreated, eventually leads to metabolic syndrome where insulin levels in the blood rise to high sustained levels causing a group of risk factors that lead to the following chronic decreases, obesity, diabetes, heart disease, high blood pressure and stroke (Raviraj et al., 2010).

### **Complications of diabetes mellitus**

People with diabetes may experience many serious long-term complications. Some of these conditions begin with months of the onset of diabetes although most tend to develop after a few years. Most of the complications are the result of problems with blood

vessels. High sugar level over a long time causes narrowing of both the small and large blood vessels. Sugar and salt have been found to play important role in producing several of the traits and abnormalities that intensify atherosclerosis, a disease condition characterizes by deposition of cholesterol and other fatty substances that line the walls of the arteries. Manifestations of atherosclerosis depend on the affected organs and severity of involvement. These include heart attack, heart failure, stroke, hypertension etc.

Atherosclerosis, an increased generalized thickening of the walls of arterioles related to hypertension may also be a complication of diabetes. The range is often most prominent in the kidneys, although other internal organs may be similarly affected individuals with the disease have an increased incidence of the lesion. Poor circulation to the skin can lead to ulcers and infections usually the feet and legs. Too often these wounds heal slowly or not at all. This is because of high level of sugar in the blood, providing a favourable habitation for microbes and decreases the ability of white blood cells to fight infections (Ugwuja and Eze, 2007). Damage of the blood vessels of the eye can cause loss of vision (diabetic retinopathy).

Although the study of (Stewart et al., 1989) shows that those with diabetes mellitus have good quality of life in comparison to those with some other chronic disease and even to health population, studies have also shown variability in the quality of life of type I and II diabetes. For example (Gafvels et al., 1993) found that patients with diabetes mellitus more frequently lived alone and remained childless, participated in fewer social activities and indicated less personal satisfaction than the control patients.

Socio-economic impact assessment of a disease is designed to estimate the effect of such a disease/illness (diabetes mellitus) on a community's social and economic welfare. It shows the study of the effect of diabetes on the social well being of the patients with diabetes mellitus and the effect of the disease on their income. Socio-economic also studies the relationship between economic activity and social life. It narrows more on behavioural interaction of individuals and group through social life and capital (John et al., 1987). The indicators used to measure the potential socio-economic impact of a development include demand for public, services; and change in the

aesthetic quality of the community. The quantitative measurement of such factors is an important component of the socio-economic assessment. The objectives of the study have been, (1) to evaluate the prevalence of diabetes mellitus in relation to the socio-economic status (2) to determine the health care cost of diabetes mellitus, and (3) to evaluate government's assistance to victims of diabetes mellitus, in Imo State, Nigeria.

## Materials and methods

### Design of the study

From the 11<sup>th</sup> of October, 2010 to the 10<sup>th</sup> of December, 2010, a patient's survey was carried out on diabetic patients in Imo State, Nigeria. The survey was done with a questionnaire with over 30 questions examining the estimated amount spent on drugs, physician services, diagnosis, food supplements and treatment of complication by diabetic patients. Also included in the questionnaire is government's contribution towards the management and care of diabetes mellitus. The level of education and the estimated monthly income of the patients were investigated so as to evaluate the financial burden of the disease on the patients. Also considered were the ages of the patients and the extent to which the disease affects the patient's productivity.

### Study area

The study was done in Imo State, which is one of the Southern States of Nigeria, sharing boundaries with Abia State, Anambra State, and Rivers State. The state is located on latitude 5°25' and 5°29' N and longitude 6°59' and 7°3' E. The state is cosmopolitan, although dominated by the ethnic Igbos that is the native dwellers of the state. The state is divided into three zones, which are Owerri Zone, Orlu Zone and Okigwe zone. The state is made up of 27 Local Government Areas and is highly populated; as a result, there is also a high incidence of diabetes mellitus in the state.

### Study population

A total of two thousand (2000) copies of questionnaires were produced for the research. One thousand, six hundred and ninety two (1692) copies of questionnaires were dispatched within the time frame, which is about 84.6% of the total number of

questionnaires produced. A total of one thousand, four hundred and forty four (1444) copies of questionnaires were successfully returned giving a response rate of 72.2%

### Selection criteria

The subjects were selected based on the evidence of their diabetic conditions, which was confirmed by having a fasting blood sugar greater and equal to 150mg/dl, confirmed using glucose oxidase method. Another criterion or selection of subjects was the willingness of the patient to cooperate with the researcher which was evident by their informed consent

### Exclusion criteria

Patients that showed skepticism to the essence of the study and those from whom informed consent could not be obtained were excluded from the survey,

### Statistical analysis

The statistical analysis was done using simple percentage and was represented using tables, bar charts and pie chart.

## Results

The findings of the present study are given in Tables 1 to 9. Among the subjects studied 63.9 were male patients (Table 1). The distribution of diabetes was more prominent in the patients aged between 51-60 years accounting a highest percentage of 27.1% (Table 2). More than 30% subjects were found to be completed the primary and secondary education where uneducated subjects contributed least (11.3%) (Table 3).

**Table 1. Sex-wise distribution of patients.**

Sex of diabetic patient	No. of subjects	%
Male	922	63.9%
Female	456	31.6%
Sex not indicated	66	4.5%

**Table 2. Age-wise distribution of subjects.**

Age range	No. of subjects	%
Less, than 30	30	2.1
31-40	80	5.5
41-50	262	18.1
51-60	392	27.1
61 and above	680	47.1

**Table 3. Educational status of the subjects.**

Education status	No. of subjects	%
Completely uneducated	163	11.3
Primary education	518	35.9
Secondary education	447	30.9
Tertiary education	316	21.9

**Table 4. Income-wise distribution of subjects.**

Income range (₦)	No. of subjects	%
20,000 and below	441	30.5
20,000 – 40,000	208	14.4
40,000 – 60,000	387	26.8
60,000 – 80,000	223	15.4
80,000 and above	185	12.8

### Economic/financial cost of diabetes in Imo State

The result of this study revealed that about 30.5% of the total subjects surveyed earned less than ₦20, 000 monthly and about 44.9% earned less than ₦40, 000 monthly (Table 4). Since the average amount spent on diabetes mellitus monthly by patients in Imo state is ₦20, 000 for cases without complications and ₦29, 000 monthly for cases with complications.

It then means that more than 44% of the total subjects cannot adequately afford the financial cost of their diabetic condition considering their monthly income especially if they have complication. This implies that most diabetic patients in Imo state spend on their diabetic condition more than their monthly income. This conforms to the study by Zimmer (2003), that diabetes and its complication constitute serious financial burden on patients. Mohan et al. (2004) also stated that diabetes mellitus drains a significant percent of the health budget. This is in line with the findings Roger et al. (2011), that good number of diabetic patients cannot afford healthy food. The cost distribution of subjects with and without complications is shown in Table 5 and Table 6 respectively.

**Table 5. Cost distribution table for patients without complications.**

Patients needs	Amount (₦)	%
Food supplements/special diets	14,000	70
Hospital bills	600	3
Consultation/diagnosis	1,400	7
Drugs	4000	20

Nephropathy was the highest complication observed among the subjects (33.6%) followed by cardiovascular diseases (22%). The subjects in the present study were suffering from diabetes mellitus ranging from less than 5 years to more than 14 years. However, highest number of patients was found between 6 years and 10 years (40.9%) (Tables 7 and 8).

**Table 6. Cost distribution table for patients with complications.**

Patients needs	Amount (₦)	%
Food supplements/special diets	12,000	41.4
Hospital bills	5,500	18.9
Consultation/diagnosis	1500	5.2
Drugs	10,000	34.5

**Table 7. Nature of complications of the subjects.**

Complications	No. of subjects	%
Retinopathy (eye related)	58	4
Cardiovascular (heart related)	320	22
Nephropathy (renal related)	485	33.6
Neuropathy (brain related)	143	9.9
Amputation	95	6.6
All complications	26	1.8
Without complication	317	22

### Social cost implications

The study also shows that about 54% of the total subjects had job limitations as a result of their diabetic conditions (Table 9). This agrees with the report of Mohan et al. (2004) that diabetes mellitus affect the job of its sufferers and sometimes reduces their productivity. Gafvels et al. (1993) reported that patients with diabetes mellitus most frequently lived alone, participated in fewer social activities and indicated less personal satisfaction than the control patients.

From this study, the following information has been deduced. Social status plays a significant role in the diagnosis of diabetes as reported by Mohan et al (2004) and Connolly et al. (2000) found that in developing countries, most studies suggest that higher prevalence of type II diabetes associated risk factors and diabetic complication rate vary inversely with socio-economic status, i.e., in the lower socio-economic status population. This could be caused by unhealthy lifestyle, nutritional inadequacies and psychological stress. This agrees with the report given



by Roger et al. (2011). An increased rate of obesity, smoking and physical inactivity in socially deprived areas has been observed. The work done by Mohan et al. (2004) has the same conclusion.

**Table 8. Duration-wise distribution of diabetes mellitus.**

No. of years	No. of subjects	%
Below 5 years	352	24.2
6 years – 10 years	590	40.9
11 years – 15 years	162	11.2
15 years and more	346	23.5
The mean duration of diabetes mellitus from the study is 7.8 years.		

**Table 9. Duration-wise distribution of diabetes mellitus.**

Status of limitation	No. of subjects	Degree (°)
Job limitation	782	195
Without limitation	461	115
Not indicated	201	50

Mohan et al. (2004) also reported that individuals belonging to the lower socio-economic status have an increased incidence of retinopathy and nephropathy. The Healthcare cost of people with diabetes mellitus in Imo State is more than double what health care spending would be without diabetes. This is similar to the situation in United States as reported by the American Diabetes Association (2003).

The complications of diabetes mellitus accounts for substantial cost with the management of nephropathy (renal related complication) being the most prevalent in Imo state. This is related to the report by Connolly et al. (2000), although they reported that diabetic complication rate vary inversely with socio-economic status in developing countries. There is no evidence of any government policy that is specific to diabetic patients in Imo state. This is completely different from what is obtainable in the United States and other developed countries than people in the rural areas. This could be as a result of low level of income and the lower awareness of the disease in the rural areas. This is the case with other developing countries as shown by the study in India by Ramachandra et al. (2007). It was also observed that government (both the state and local government) had no form of contribution to the treatment and care of diabetic patients.

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