

# Gender Differential in the Incidence of Diabetes Mellitus among the Patients in Udi Local Government Area of Enugu State, Nigeria

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## **Abstract**

*Diabetes Mellitus is a chronic metabolic disease characterized by hyperglycemia and disturbances of carbohydrate, fat and protein metabolism. It is a major public health problem and disease burden worldwide, and especially in Nigeria. This study determined the gender differential in the incidence of Diabetes mellitus among the patients in Udi L.G.A of Enugu State. Three research questions and one hypothesis were formulated to guide the study. Descriptive survey design was employed. A sample of 343 diabetes mellitus patients were randomly selected and used for the study. Researchers design data documentary profoma was used to collect the data from selected health facilities in respect to the patients' gender and their fasting sugar level as contained in their folder or hospital record/register. Frequency and percentages was used to answer research question while the null hypothesis was tested using Chi- square at 0.05 level of significance. The finding of the result revealed a high incidence of Diabetes Mellitus in 2012, females recorded a high incidence of DM from 2008-2012 and high percentage of fasting blood sugar level than male. The finding also revealed no difference in the fasting blood sugar based on gender. It is recommended among others that diagnostic investigation on human placental lactose is advocated to reduce or stop its opposition to insulin secretion during pregnancy.*

**Keywords:** *Diabetes; Insulin; Hyperglycemia; Glucose; Incidence*

## **1. Introduction**

Diabetes mellitus is a chronic metabolic disease characterized by hyperglycemia and by disturbances of carbohydrate, fat, and protein metabolism. It is defined as a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces (World Health Organization-WHO & International Diabetes Federation-IDF, 2006). It is associated with an

absolute or relative deficiency in the secretion and /or action of the hormone insulin (Alberto & Swapnil, 2001). The blood sugar concentration or blood glucose level is the amount of sugar present in the blood of an individual. In man, the body maintains the blood glucose level at a range between about 3.6 and 5.8 mm (mmol/L, i.e., millimoles/liter), or 82 and 110 mg/dL (Ogbera, Chinenye, Onyekwere & Fasanmade, 2007). The blood sugar levels outside the normal range are indication of a medical condition. A persistently high level is referred to as hyperglycemia; low level is referred to as hypoglycemia and, if not given proper medical care is inimical to health. Diabetes mellitus is characterized by persistent hyperglycemia and is the most prominent disease related to failure of blood sugar regulation (WHO & IDF, 2006).

The number of diabetic cases worldwide has increased significantly in the last decade and it is the fifth leading cause of death worldwide (Wild, Roglic, Green, Sicree & King, 2004), and has been noted that one in twenty adult deaths in developing countries is diabetes related (Gojka, Nigel, Bennet, Mathers, Tuomiletho, & Satyatjit, 2005). WHO (2010) reported an incidence rate of 300 million people with diabetes in the world in the year 2010 and is projected to increase to 366 million by 2030. There is an increase of the incidence of Diabetes Mellitus in the African population. The global estimate of the number of people with diabetes in Africa was approximately 3million in 1994 and was due to go through a 2-3 fold increase by the year 2010 (Amos, McCarty, & Zimmet, 1997). Oguntola (2011) submitted that the African region experience the incidence rate of DM at 3.8 per cent a total of 13.1 million people. Over the past 3 decades, diabetes has been increasing steadily in Nigeria. In 2008, Nigeria had an incidence rate of over 12 million diabetic patients (Population Reference Bureau, 2008), while the incidence rate was 4.7 per cent of the population in 2011 (Oguntola, 2011). WHO and IDF (2006) reported that Nigeria has the greatest number of people living with diabetes in Africa. The authors added that diabetes and its complications impose significant economic consequences on individuals, families, health systems and countries. The threat is growing; the number of people, families and communities afflicted is increasing. This growing threat is an under-appreciated cause of poverty and hinders the economic development of many countries (WHO, 2009).

According to WHO & IDF (2006) diabetes mellitus is of three main types: type 1, type 2 and gestational diabetes. Type 1 diabetes also known as insulin-dependent diabetes mellitus (IDDM), is a severe, chronic form of diabetes caused by insufficient production of insulin and resulting in abnormal metabolism of carbohydrates, fats, and proteins. It appears in childhood or adolescence, is characterized by increased sugar levels in the blood and urine, excessive thirst, frequent urination, acidosis, and wasting. The life expectancy of a child with Type 1 diabetes is as low as seven months in rural African country like Nigeria caused mainly by limited access to insulin and its cost and a lack of infrastructure within the healthcare system. In the USA, ninety-eight per cent of Type 1 patients live six years after diagnosis but only one per cent of children currently survive six years in sub-Saharan Africa. Type-2 diabetes, also known as non-insulin-dependent diabetes mellitus (NIDDM), is a mild form of diabetes that typically appears first in adulthood and is exacerbated by obesity and an inactive lifestyle. This disease often has no symptoms, is usually diagnosed by tests that indicate glucose intolerance, and is treated with changes in diet and an exercise regimen (WHO & IDF, 2006). Gestational diabetes is a form of glucose intolerance diagnosed during pregnancy. It is common among obese women and women with a family history of diabetes. After pregnancy, 5 to 10 per cent of women with gestational diabetes are found to have type 2 diabetes. Also, women who had gestational diabetes have a 35 to 60 per cent chance of developing diabetes in the next 10-20 years (National Diabetes Statistics NDS, 2011). Popoola (2005) asserted that the most prevalent type of DM in Nigeria is diabetes type 2 or non-insulin-dependent diabetes mellitus (NIDDM) influenced by demographic factors (knowledge of diabetes, diabetes self-support, diabetes self-care management, patient's age, level of education, location of clinics, socio-economic status, gender, occupational type, anthropometric parameters and household wealth) influence management of DMT1 and DMT2 among diabetic patients attending clinics and hospitals in Nigeria generally and in Udi LGA in particular.

Incidence means the frequency of occurrences of cases of a disease or spells of illness, or the number of new times something new happens especially a disease (Lucas & Gilles, 2003). Complex causes of

diabetes are in large part due to rapid increases in overweight, obesity and physical inactivity (WHO, 2011).

Clavel (2005) asserted that symptoms of diabetes mellitus may develop quite fast in type I (insulin dependent) diabetes but may be subtle or completely absent-as well as developing much more slowly in type II (NIDDM). According to the author, the classical triad of diabetes symptom is polyuria (excessive urination), polydipsia (increased thirst), polyphagia (excessive eating), weight loss and irreducible fatigue. Blaise (2005) reported that symptoms of diabetes mellitus include tingling and numbness in hands and feet, very dry skins, sores, more infections than usual, nausea, vomiting or stomach pain and general irritability. Unexplained weight loss despite adequate food intake resulting that glucose from ingested and digested meals do not get to the target organs like the liver and muscles where they will be utilized or that they get there but the receptors are not functional. Achalu, (1998) posited that people with diabetes experience sexual weakness, delivery of large babies, still births or recurrent abortion in women, becoming tired/weak/fatigue despite adequate and balanced food intake and when you have not done any strenuous task. Weakness in diabetes results from non utilization of glucose by the organs of the body. In a like manner, diabetes is an immunosuppressive disorder and it is all due to hyperglycaemia's toxicity on the immune system. Similarly, frequent skin infection is another symptom of diabetes and it even becomes more common when the blood sugar raises so much, wounds that are slow to heal, particularly sores on the feet and ankles, and recurrent vaginal infection (in women), are signs of possible diabetes that are somewhat more likely to draw attention and result in a diagnosis. These may lead to severe consequences and complications.

Consequences of DM in general, according to WHO and IDF (2006), include damage to the heart, blood vessels, eyes, kidneys, and nerves; diabetes increases the risk of heart disease and stroke. Fifty per cent of people with diabetes die of cardiovascular disease (primarily heart disease and stroke). Combined with reduced blood flow, neuropathy in the feet increases the chance of foot ulcers and eventual limb amputation. Diabetic retinopathy is an important cause of blindness, and occurs as a result of long-term accumulated damage to the small blood vessels in the retina. After 15 years of diabetes, approximately 2 per cent of people become blind, and about 10 per cent develop severe visual impairment. Diabetes is among the leading causes of kidney failure; 10-20 per cent of people with diabetes die of kidney failure. Diabetic neuropathy is damage to the nerves and affects up to 50 per cent of people with diabetes.

Several factors have been implicated in onset of diabetes mellitus. Harris, Courie, Reiber, Bonko, Stern and Benneth (1995) reported that genetic susceptibility, age, obesity, sex, pregnancy, diet, stress, low birth weight and exercise are the factors associated with the onset of diabetes. WHO (2000) observed that a genetic element known as Histo-compatibility Locus Antigen (HLA) in few individuals triggers diabetes. Another cause of diabetes mellitus is obesity- abnormal fat out of desirable range 18.5 to 24.9kg/m<sup>2</sup>.

Gender is a strong factor associated with the manifestation of diabetes mellitus. Gender according to Kendra (2013) refers to the personal sexual identity of an individual, regardless of the person's biological and outward sex. Differing societal expectations in different cultures establish the behavioural, psychological and physical attributes that are associated with one gender or another. Al – Nazha et al (2004) observed a high increase of DM among males of 29.6 per cent compared to 26.5 per cent in female at Saudi Arabia. Men develop type 2 DM at a high rate than their female counter parts. Oguntola (2011) reported that though men have less weight gain than women, men stand a high risk of developing diabetes more easily and at a young age than women because of the way fat is distributed around their body. Men have fat around the abdomen (which decreases the bodies sensitivity to insulin) and in the liver than women, who on the other hand tend to carry a greater proportion of their body fat under the skin as well as in thighs and buttocks, which is thought to be less risky for type 2 diabetes and other health problems. Furthermore, the disparity between men and women could also be due to the fact that women nowadays have gone calorie conscious irrespective of age and they follow a strict regime which encloses regular exercise and balance diet. Likewise, it has been observed that men of both low and high alcohol consumptions, current and former smokers were associated with the increase risk of having diabetes mellitus. (Liu, Yu, Li, Wang, Sun, Qi & Lin, 2010; Choi & Shi, 2010).

On the contrary, Albert, Boucher, Hitman and Taylor (1990) observed that women are more often

affected by diabetes. They suggested that pregnancy may add to the likelihood of developing or having diabetes in women. During pregnancy, diabetes may manifest in genetically susceptible women. Likewise the cause of the diabetes in women may be attributed to human placental lactogen secreted by the placenta which opposes the action of insulin (Thomas, 1988). Al-tamimi and Peterson (1998) observed that women continue to consume sweetened food, even though they knew about the deleterious impact of sugar on oral and dental tissues while King, Aubert and Herman (1998) alluded that some of the significant reasons why diabetes mellitus was more predominant among women when compared to men were ascribed to attention to family priorities and women's inability to exercise in public places based on religious beliefs. Based on the recorded rise in incidence and the burden of diabetes in Nigeria, it is expedient to ascertain the gender differential in the incidence of DM among the patients in Udi LG A of Enugu State, Nigeria.

### 1.1 Purpose of the Study

The purpose of this study is to find out the gender differential in the incidence of DM among the patients in Udi L. G. A. of Enugu State. Specifically, this study answered the following research questions.

1. What is the incidence of DM among DM patients attending health facilities in Udi LGA?
2. What is the incidence of DM among DM patients based on gender?
3. What is the difference in fasting blood sugar level of DM patients based on gender?

### 1.2 Hypothesis

The null hypothesis was postulated and tested at 0.05 level of significance.

1. There is no significant difference in the fasting blood sugar level based on gender.

## 2. Methodology

The study was carried out on diabetes mellitus patients from six health facilities in Udi L. G. A. of Enugu State. A survey research design was used in the study. The population for the study comprised of all diabetes mellitus patients who attended health facilities from 2008-2012 in Udi L.G.A. A sample of 343 Diabetic patients was randomly selected from the health facilities. The researchers designed a data documentary DM profoma (DMP) for the collection of information concerning cases of Diabetes mellitus in all the selected health facilities in Udi L.G.A. Data from the document provided information in respect of DM patients gender, and the patients' fasting sugar level (FSL) as contained in the patients folder or hospital record/register. Frequency and percentage was used to answer research questions and chi-square was used in testing the null hypothesis at 0.05 level of significance.

## 3. Results

The results of the study are presented based on the research questions and the hypothesis. The findings are presented as follows:

### 3.1 Research Question 1

What is the incidence of DM among patients in Udi LGA? Data answering the question one are contained in Table 1.

**Table 1.** Frequency and percentages of incidence of DM among patients in Udi LGA (n = 343).

Year	f	%
2008	10	2.9
2009	71	20.7
2010	70	20.4
2011	89	25.9
2012	103	30.0
<b>Total</b>	<b>343</b>	<b>100</b>

Data in Table 1 shows the highest number of diabetes mellitus of 103 cases (30.0%) occurred in 2012, 89 cases (25.9%) in 2011, 71 case (20.7%) in 2009 followed by 70 cases (20.4%) which occurred in 2010. The table further shows that 10 cases (2.9%) occurred in 2008.

### 3.2 Research Question 2

What is the incidence of DM among Patients in Udi L.G.A based on gender? Data in Table 2 provided the answer to this question.

**Table 2.** Incidence of DM among patients based on gender (n=343).

Year	Male		Female	
	F	%	f	%
2008	4	40.0	6	60.0
2009	31	43.7	40	56.3
2010	29	41.4	41	58.6
2011	40	44.9	49	55.1
2012	47	45.6	56	54.4
<b>Total</b>	<b>151</b>	<b>44.0</b>	<b>192</b>	<b>56.0</b>

Data in Table 3 show that a higher proportion or cases of Diabetes Mellitus was recorded among females (56.0%) than the males (44.0%). The table further shows a progressive increase in the incidence of DM from 2008 with the frequency of (male = 4 40.0%)

### 3.3 Research Question 3

What is the difference in fasting blood sugar level of DM patients based on gender? Data answering this research question are contained in Table 3.

**Table 3.** Differences in fasting blood sugar level of DM patients according to gender.

Fasting blood Sugar Level	Gender			
	Male		Female	
	f	%	f	%
121 – 200	53	50.5	52	49.5
201 – 280	44	41.9	61	58.1
281 – 360	24	36.9	41	63.1
361 and above	30	44.1	38	55.9
<b>Total</b>	<b>151</b>	<b>44.0</b>	<b>192</b>	<b>56.0</b>

Table 3 above shows that female gender (192, 56%) recorded higher percentage of fasting blood sugar level

than the male gender (151, 44%). The table further indicates that among the female gender, FBSL is more pronounced on 201-280mg /dl followed by 121-200mg/dl.

### 3.4 Hypothesis 1

There is no significant difference in the fasting blood sugar level based on gender. Data testing this hypothesis are contained on Table 4.

**Table 4.** Summary of chi-square  $\chi^2$  analysis testing the null hypothesis of no significant difference in the fasting blood sugar level based on gender.

Fasting blood Sugar level	Gender	
	Male	Female
121 – 200	53 (46.2)	52 (58.8)
201 – 280	44 (46.2)	61 (58.8)
281 – 360	24 (28.6)	41 (36.4)
361 and above	30 (29.9)	38 (38.1)
Total	151 (151.0)	192 (192.0)

Cal.  $\chi^2 = 3.295$ ,  $df = 3$ ,  $P. value = .348$ .

Table 4 shows a calculated  $\chi^2$  value of 3.295 at 3 degrees of freedom with a P. value of .348 which is more than .05 level of significance. The null hypothesis that there is no significant difference in the fasting blood sugar level based on gender is therefore accepted. This therefore implies that there is no significant difference in the fasting blood sugar level based on gender. Fasting blood sugar level does not differ based on gender

## 4. Discussion

The finding in Table 1 indicated a progressive increase in the incidence of diabetes mellitus. 2012 recorded the highest incidence with the frequency of 103 (30.0%) cases of diabetes mellitus in Udi LGA. This result is expected and not surprising because it is in line with the findings of WHO & IDF (2006) who reported that Nigeria has the greatest number of people living with Diabetes in Africa. The finding on this progressive increase in the incidence may be because of quality of food which is majorly carbohydrate and fat consumed by this people. Garri and Abacha (African salad) which is made from cassava, and yam are the staple food in the area. As they consume the carbohydrate, it may be that they do not exercise to burn off excess glucose thereby leading to the storage of excess glucose in the body.

The finding in Table 2 revealed that females recorded a higher incidence of Diabetes mellitus from 2008 – 2012 than males. The result is expected and not surprising. This can be attributed to the fact that the female are in charge of the kitchen and food. Some women eat while they cook the food and some eat junk starchy food in between meals combined with the starchy food that is more stable in the home. This is supported with the finding of Al-tamimi and Peterson (1998) who observed that women continue to consume sweetened food, even though they knew about the deleterious impact of sugar on oral and dental tissues. King, Aubert and Herman (1998) alluded that some of the significant reasons why diabetes mellitus was more predominant among women when compared to men were ascribed to attention to family priorities and women's inability to exercise in public places based on religious beliefs.

The finding in Table 3 revealed that female recorded a higher percentage of fasting blood sugar level

than male. This is not surprising because Albert et. al (1990) observed that women are more often affected by diabetes. They suggested that pregnancy may add to the likelihood of developing or having diabetes in women. During pregnancy, diabetes may manifest in genetically susceptible women. More so, the study of Thomas (1988) revealed that the cause of the diabetes in women may be attributed to human placental lactogen secreted by the placenta which opposes the action of insulin.

The finding in Table 4 revealed no significant difference in the fasting blood sugar level based on gender. This finding is expected and not surprising because both the males and the females in the study area consume the same stable food which is mostly carbohydrate or starchy food such as garri, rice and yam. Experience has shown that these people have several joints where they sit and drink sometimes all through the day. This factor has prevented them from engaging in exercises which will help to burn excess glucose the blood stream.

## 5. Conclusions

Based on the findings and discussions,, it was concluded that:

1. There is a high incidence case of diabetes mellitus in 2012 in Udi L.G.A.
2. Incidence of Diabetes mellitus was more on female than the male.
3. Female recorded a higher percentage of fasting blood sugar level than male.
4. There is no significant difference in the fasting blood sugar level based on gender.

## 6. Recommendations

Based on the findings, discussions and conclusions, the following recommendations were made:

1. Sensitization of the general public on Diabetes mellitus is paramount in view of its high increase and burden to Nigeria.
2. Health education of the public on the consequences of consumption of excessive caloric food without exercises is implicated for diabetes.
3. Diabetes prevention and control programs are urgently needed especially among pregnant women to reduce the burden of diabetes mellitus.
4. Diagnostic investigation on human placental lactose is advocated to reduce or stop its opposition to insulin secretion during pregnancy.

## References

- Achalu, E. (1998). Communicable and non-communicable diseases, Cause and prevention. Ibadan: African Link Books.
- Albert, K.G.M.M, Boucher, B.J. Hitman, G.A & Taylor, R. (1990). Diabetes Mellitus. In: The Disease. London: Balliere Tindall. *Metabolic and Molecular Basis of Acquired Disease*. London: Belliere Tindall.
- Alberto, B, & Swapnil, R. (2001). Incidence and prevalence of diabetes mellitus in the Americas. *Rev. Paron Salud Publica/Pan Am J Public Health* 10 (5) 300-308.
- Al-Nozha, M.M, Al-Maatoug M.A, Al-Mazrou, Y.Y, et al. (2004). Diabetes mellitus in Saudi Arabia 25:1603-1610. *America*. (2nd ed.). Washington D.C: U.S. Government Printing Office.
- Al-tamimi, S & Peterson, P. (1998). Oral health situation of school children mothers and school teachers in Saudi Arabia. *Int Dent J*.48 (30): 180-6
- Amos, A. F, McCarty, D. J. & Zimmet, P. (1997). The risking global durden of diabetes and its complications: estimates and projections to the year 2010. *Diabet Med* 14: 1-85.
- Blaise (2005). Causes and prevention of diabetes. <http://www.blaiseweb.com/artcld/d/i/Diabetes.html> (Retrieved 18<sup>th</sup> January 2011.from African Americans. *Holistic Nurse Practice*, 19, 10-16.
- Choi, B. C & Shi, F. (2010). Risk factors for diabetes mellitus by age and sex: result of the National Population Health Survey. Retrieved on 4<sup>th</sup> Jan 2013 from [www.ncbi.nlm.nih.gov/pub/med/11692170](http://www.ncbi.nlm.nih.gov/pub/med/11692170)
- Clavel, M.C. (2005). *Mayo clinic on managing diabetes*. New York: Kensington Publishing Corporation.

- Gojka, R.U., Nigel, P., Bennet, C., Mathers, J., Tuomilehto, & Satyajit, N. (2005). The burden of mortality attributable to diabetes: realistic estimates for the year 2000. *Diabetes Care*, 28, 2130-2135.
- Harris, M. I.; Courie, C. C. Reiber, G, Bonko, E. Stern, M, Benneth, P. (1995). *Diabetes in America*. (2<sup>nd</sup> ed). Washington DC: U.S. Government Printing Office.
- Hornby, A. S. (2001). *Oxford Advanced Learner's Dictionary of Current English*. Oxford: Oxford University Press.
- Kendra C. (2013). What is gender? About.com Guide. Retrieved 16/06/2013 from <http://psychology.about.com/od/gindex/g/gender.htm>
- King, H, Aubert, R.E, & Herman, W.H. (1998). Global burden of diabetes, 1995 – 2025. Prevalence, numerical estimates and projections. *Diabetes Care* 21: 1414 – 1431.
- Lucas, A. O. & Gilles, H. M. (2003). *Short textbook of public health medicine for the tropics* (4<sup>th</sup> Ed.). Ibadan: Bookpower ELST.
- Liu, C; Yu, Z, Li; H, Wang, J, Sun, L, Qi, Q & Lin, X. (2010). Association of alcohol consumption with diabetes mellitus and impaired fasting glycaemia among middle – aged and elderly Chinese. Retrieved from [www.biomedcentral.com/1471-2458/10/713](http://www.biomedcentral.com/1471-2458/10/713).
- National Diabetes Statistics (2011). National diabetes information clearinghouse. Retrieved on 24<sup>th</sup> Feb 2013 from <http://diabetes.niddk.nih.gov/dm/pubs/statistics>
- Ogbera, A., Chinenye, S., Onyekwere, A., & Fasanmade, O. (2007). Prognostic indices of diabetes mortality. *Ethnicity Dis.*, 17, 721-725.
- Oguntola, S.(2011).Why men develop diabetes more easily than women. Retrieved September 16, 2012 from [www.tribune.com.ng/index.php/your-health](http://www.tribune.com.ng/index.php/your-health).
- Popoola, M. M. (2005), *Living with diabetes. The holistic experiences of Nigerians and African Americans*. *Holistic Nurse Practice*, 19: 10-16.
- Population Reference Bureau (2008). World population data sheet. [http://www.prb.org/pdf08/WPDS\\_Eng.pdf](http://www.prb.org/pdf08/WPDS_Eng.pdf). Retrieved October 17, 2011.
- Thomas, B. (Ed.) (1988). *Dietary management of children with diabetes mellitus*. Oxford: Blackwell Scientific Pub.
- WHO (2000). *Global water supply and sanitation assessment 2000 report*. London: Earthscan Publication Limited.
- WHO (2009). WHO, African region: Nigeria. Retrieved from <http://www.who.int/countries/nga/areas/hiv/en/index.html> on October 17, 2011.
- WHO (2011). Diabetes: Fact sheet. Retrieved from <http://www.who.int/mediacentre/factsheets/fs312/en/index.html> on October 17, 2011.
- Wild, S., Roglic, G., Green, A., Sicree, R., King, H. (2004). Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care*. 27: 1047 -1053.
- World Health Organization (2010). Department of Non Communicable Disease surveillance Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications. Retrieved 18th March, 2011.
- World Health Organization-WHO and International Diabetes Federation-IDF (2006). *Definition and diagnosis of diabetes mellitus and intermediate hyperglycemia: Report of a WHO/IDF consultation*. Geneva: WHO.