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Research Article

# Socio-demographic, Clinical Profile and Status of Glycaemic Control Among Diabetic Patients in a Rural Tertiary Hospital

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## Abstract

**Background:** Diabetes mellitus is one of the most relevant issues of contemporary healthcare due to its prevalence, its physical and psychosocial consequences for patients and their family; and its economic impact on the society. Poor control may result in complications.

**Objective:** The study assessed the relationship between socio-demographic characteristics, clinical profile and glycaemic control among adult Type 2 Diabetes Mellitus (T2DM) attending diabetic clinic of Family Medicine department of a tertiary hospital.

**Method:** This was a cross sectional study carried out among 367 patients selected by systematic random sampling method. Relevant data collected through a semi-structured questionnaire, clinical data recorded and fasting plasma glucose were utilized for the study. Data were analysed using SPSS version 20.

**Results:** The female to male ratio was nearly equal (1.01:1). The mean (SD) age of respondents was 61.7 ± 11.4 years. Majority 306 (83.4%) of the respondents were older than 50years of age. Most respondents, 164 (44.7%) lived on less than two US dollars per day. About half, 168 (45.8%) had a good glycaemic control. Significant relationship exists between marital status, socioeconomic status, smoking, number of co-morbidities, BMI and glycaemic control. Level of education, occupation, and social status can play an independent role in glycaemic control.

**Conclusions:** From this study, control of diabetes was still not at the optimal level among the diabetes population, and socio-economic status has a role to play in glycaemic control.

**Keywords:** Clinical Profile; Glycaemic Control; Socio-Demographic Characteristics; T2DM

## Introduction

Diabetes is a chronic medical condition that occurs when the body cannot produce enough insulin or cannot use insulin in adults [1,2]. The increasing burden of type 2 diabetes mellitus (T2DM) is attracting a worldwide attention as an important risk factor for premature death from non-communicable disease. The prevalence of T2DM varies in different populations according to reports [3,4]. Research studies have demonstrated that T2DM is relentlessly increasing worldwide affecting economically affluent nations and is gradually creeping and afflicting developing countries [5-8]. In sub-Saharan Africa, T2DM constitutes an important clinical and public health problem and affected 19 million people with predicted rise to 41.5 million by 2035 [5]. Evidences abound that glycemic control reduces many of the long-term complications of diabetes, especially microvascular complications, making it an important goal of diabetes care [9,10]. However, glycemic control remains an herculean task for many patients with type 2 diabetes worldwide. The burden of diabetes and its rate of control are not equally distributed among populations in Nigeria. Both the prevalence and control of diabetes showed marked inequality across age, socioeconomic, and educational groups [10,11]. The regional prevalence of T2DM in Nigeria which varies across different parts of the country could be a pointer to cultural, tribal and food values and lifestyles. Poor glycemic control among T2DM may cause blindness, cardiovascular disease, kidney failure, lower limb amputation and several other long term complications that impact significantly on quality of life [12,13].

Most studies identified that socio-demographic characteristics associated with glycaemic control include: age, gender, ethnicity, educational level, family history, employment status, socio-economic status, housing, food security, cultural beliefs and practices, geographical locations, health literacy, social support and religious beliefs [2,14-18]. Socio-economic status (SES) is associated with inequality significantly in both the prevalence and control of diabetes, and its associations can potentially be modified. To the best of authors' knowledge, there have been no published and peer reviewed research studies conducted in Ekiti State on the association of socio-demographic factors to glycemic control among T2DM patients. So the aim of this study was to determine the proportion of glycemic control level and its socio-demographic determinants among T2DM adults attending clinics at Federal Teaching Hospital, Ido-Ekiti (FETHI). Knowledge of these factors will assist physicians to identify those who are at risk of having poor glycaemic control and will be used to provide targeted interventions as well as ensure efficiency and effectiveness of diabetes clinics in Ekiti State.

## Materials and Method

### Study population

The study population was selected from among adult aged 30 years and above with T2DM attending family medicine department diabetic clinic of FETHI. FETHI is now a referral centre for health institutions in Ekiti state and adjoining states of Kogi, Kwara, Ondo and Osun states.

### Study design

This was a cross-sectional hospital-based study.

### Study site

The study was conducted in the diabetic clinic of the department of Family Medicine, Federal Teaching Hospital, Ido-Ekiti, Ekiti State, South-Western, Nigeria. This tertiary healthcare facility serves as a referral centre for other health institutions (General hospitals and Comprehensive health centres) in Ekiti State and environs. The family medicine department runs a daily diabetes clinic. The clinic is run by the resident doctors under the supervision of consultant Family Physician.

### Sample size

A sample size of 367 was statistically determined for the study using prevalence rate of 60.2% reported in south-western Nigeria [19], the confidence interval of 95%, standard error of 5%, while putting into consideration 10% non-response rate, using the formula; $n = z^2p(1-p)/d^2$ and $nf = n/[1+n/N]$. n = the minimum sample size when population is greater than 10,000; nf = the minimum sample size when population is less than 10,000; N = the estimated population size in a year (T2DM in previous year at the FETHI Family medicine diabetic clinic = 3642).

### Inclusion criteria

Included were diabetes patients aged 30 years and above who had attended clinic at least twice in the last six months and had been on oral hypoglycaemic agents (OHA) for more than three months.

### Exclusion criteria

Those on combination of oral anti-diabetes medications and insulin, pregnant women and critically ill patients were excluded.

### Recruitment procedure

Systematic random sampling technique was used to recruit participants among the diabetes patients attending the clinic. The

Family Medicine Clinic record of the hospital showed that between 14 and 17 patients with T2DM attended clinic daily which translated to about 75 patients per week using an average of 15 patients per day. Family Medicine department runs outpatient clinic majorly 5days in a week thus 300 patients were expected in a month. A total of 1800 diabetic patients were expected to be encountered during the six months of study. Hence, sample interval was calculated thus: K = N/n where K = sample interval, N = total number of patients to be encountered, n = calculated sample size = 1800/367 = 4.9 (Approximated to 5). This translated to recruiting every fifth diabetic patient who attended the clinic daily. Each day the nurses separated and collated folders of all T2DM patients who usually present early because of the need to do fasting plasma glucose at each visit. The first five in order of presentation were then selected and made to pick from a container with five pieces of papers labelled with one "True" and four "False". The patient who picked "True" became the starting point for the day. Selection of other respondents was based on the sample interval, which was 5. The patient's folder was marked to prevent recruitment of a patient twice. This process was repeated daily until 367 patients were recruited over six month (26 weeks).

### Instruments used

Pre-tested semi-structured questionnaire drafted in English Language and translated in Yoruba (local language) and back-translated to English was used to obtain relevant information on the characteristics of respondents.

Five research assistants who were: a resident doctor, a nurse, two information officers and a medical laboratory scientist were used. The research assistants were recruited and trained by the investigator for two days for the purpose of data collection, viz-a-viz informed consent process, questionnaire administration and accurate clinical data measurement.

Fasting plasma glucose (FPG) test was used to determine level of glycaemic control as an objective biomedical indicator. It was assessed using mean value of fasting plasma glucose test results over the most recent three consecutive clinic visits. The first two were from patients' record while the 3rd was done by researcher at no cost to the patient. Levels of control, was classified as: Poor Control - ≥7.1mmol/l, Good Control - ≤7.1mmol/l [20]. Blood pressure (BP) was measured using an appropriate cuff-sized Accosson® mercury sphygmomanometer and stethoscope. The BP was recorded to the nearest 2mmHg. Two measurements were taken after the patient has been allowed to sit for 5-10mins and an average value was taken and classified according to JNC 7 [21].

Surgifield Sm-160 Stadiometer made in England was used to measure the height of subjects in centimetres. The height was measured with subjects standing erect against the wall-mounted scale, wearing no shoes and looking straight ahead. Measurements were taken and recorded by a trained research assistant nurse to the nearest 0.01metre. Weighing scale RGZ-160, by Lincoln Mark Medical, England, was used to measure the weight in kilograms. A standard 10kg weight was used to daily cross-check accuracy of the weighing scale. The scale was regularly adjusted to correct for zero error at the beginning of each day and after each patient. Measurements was taken and recorded to the nearest single decimal place.

## Ethical approval

Ethical approval was sought and obtained from the FETHI ethical review and Research Ethics Committee, on 4th September, 2014 with protocol number ERC/2014/06/26/34A.

### Consent

Written informed consent on participation and data publication was obtained after the study was explained to participants, and they fully understand the reasons behind the study. They were made to understand that they can withdraw from the study at any time without suffering any untoward action for refusing to participate. Full confidentiality was guaranteed.

### Data analysis

Data gathered were entered and analysed using Statistical Package for Social Sciences 16.0 (SPSS Chicago Inc., IL, U.S.A.). Frequency tables, figures were generated for relevant variables. Means, standard deviations, and percentages were determined as appropriate. The means and standard deviation (SD) were calculated for continuous variables while categorical variables were analysed using proportions. Test of significance was done using chi-square and logistic regression analysis was done. P-value of equal or less than 0.05 was taken to be statistically significant.

## Result

Table 1 illustrates the socio-demographic characteristics of the respondents. Majority 306 (83.4%) of the respondents were older than 50years of age. There was nearly equal male to female respondents 182(49.6%) males to 185(50.4%) females. About two thirds 227(61.9%) were married, 64(17.4%) were widowed, 39 (10.6%) were divorced or separated, while others were either living with a partner or single. Tertiary level of education was attained by 138(37.6%); 88(24.0%) and 61(16.6%) respondents attained secondary and primary education respectively, the others 80(21.8%)

had no formal education. The highest number of respondents were drivers and artisans 115(31.3%), followed by professional/senior civil servants and the unemployed were equally represented at 89(24.3%). Two hundred and three (55.3%) lived above $60 per month using the World Bank level of poverty in low resource countries [22], while 139(37.9%) belonged to high social strata. Table 2 shows clinical characteristics of the respondents in which the prevalence of smoking and alcohol was 27(7.4%) and 30(8.2%) respectively. The mean BMI of respondents was 25.45 ± 3.83kg/$m^2$, 168(45.8%) had good glycaemic control while 199 (54.2%) did not. Majority 339(92.3%) had one or more co-morbidities, while nearly all 342(93.2%) used two oral anti-diabetic medications. Figure 1 shows the duration of diabetes among respondents, nearly half 178(48.5%) had T2DM between one and five years. Table 3 shows statistically significant relationship between marital status, level of education, occupation, average monthly income, social strata and level of glycaemic control. Table 4 shows statistically significant relationship between glycaemic control and the following respondents' clinical parameters: number of co-morbidities, smoking and BMI ($p < 0.001$-$0.006$). Table 5 shows that glycaemic control was predicted by level of education $p = 0.046$, professional/civil servant $p = 0.020$, high and middle strata ($p = 0.013$ and $p < 0.01$ respectively) were significant predictors of glycaemic control.

| Variables | Frequency | Percent |
|---|---|---|
| Age (yrs) | | |
| 40 - 49 | 61 | 16.6 |
| 50 - 59 | 102 | 27.8 |
| 60 - 69 | 105 | 28.6 |
| ≥ 70 | 99 | 27.0 |
| Mean ± SD | 61.7 ± 11.4 | |
| Min - Max | 40.0 - 92.0 | |
| Gender | | |
| Male | 182 | 49.6 |
| Female | 185 | 50.4 |
| Ethnicity | | |
| Yoruba | 305 | 83.1 |
| Ibo | 33 | 9.0 |
| Hausa | 15 | 4.1 |
| Others | 14 | 3.8 |
| Marital status | | |
| Married | 227 | 61.9 |
| Separated/Divorced | 39 | 10.6 |
| Widowed | 64 | 17.4 |
| Living with a partner | 18 | 4.9 |
| Never married | 19 | 5.2 |
| Level of education | | |
| Tertiary | 138 | 37.6 |
| Secondary | 88 | 24.0 |
| Primary | 61 | 16.6 |
| No formal education | 80 | 21.8 |
| Occupation | | |
| Professional/Snr Civil servants | 89 | 24.3 |
| Drivers, Artisans | 115 | 31.3 |
| Messengers, Petty Traders | 74 | 20.2 |
| Unemployed | 89 | 24.3 |
| Income per month | | |
| Above $60/month | 203 | 55.3 |
| Below $60/month | 164 | 44.7 |
| Social strata | | |
| Low | 115 | 31.3 |
| Middle | 113 | 30.8 |
| High | 139 | 37.9 |

**Table 1:** Socio-demographic characteristics of respondents (N = 367).

| Variables | Frequency | Percent |
|---|---|---|
| Smoking history | | |
| Yes | 27 | 7.4 |
| No | 340 | 92.6 |
| Alcohol intake | | |
| Yes | 30 | 8.2 |
| No | 337 | 91.8 |
| Number of co-morbidities | | |
| Two or more | 119 | 32.5 |
| One | 220 | 59.9 |
| None | 28 | 7.6 |
| Number of medications used | | |
| Two | 342 | 93.2 |
| One | 25 | 6.8 |
| BMI | | |
| Underweight | 13 | 3.5 |
| Normal | 140 | 38.1 |
| Overweight | 177 | 48.2 |
| Obese | 37 | 10.1 |
| Mean ± SD ($kg/m^2$) | 25.45 ± 3.83 | |
| Glycaemic control | | |

| | | |
|---|---|---|
| Good | 168 | 45.8 |
| Poor | 199 | 54.2 |
| Mean ± SD | 8.9 ± 3.7 | |
| Blood Pressure (mmHg) | | |
| Systolic (Mean ± SD) | 134.3 ± 16.6 | |
| Diastolic (Mean ± SD) | 84.7 ± 9.4 | |

**Table 2**: Clinical characteristics of respondents.

| **Variables** | **Glycaemic control, n (%)** | | **χ2** | **Df** | **p-value** |
|---|---|---|---|---|---|
| | **Good** | **Poor** | | | |
| | **(n = 168)** | **(n = 199)** | | | |
| Age group (yrs) | | | | | |
| 40 - 49 | 33 (54.1) | 28 (45.9) | 4.178 | 3 | 0.243 |
| 50 - 59 | 51 (50.0) | 51 (50.0) | | | |
| 60 - 69 | 43 (41.0) | 62 (59.0) | | | |
| ≥ 70 | 41 (41.4) | 58 (58.6) | | | |
| Gender | | | | | |
| Male | 77 (42.3) | 105 (57.7) | 1.750 | 1 | 0.186 |
| Female | 91 (49.2) | 94 (50.8) | | | |
| Ethnicity | | | | | |
| Yoruba | 144 (47.2) | 161 (52.8) | 3.103 | 3 | 0.376 |
| Ibo | 13 (39.4) | 20 (60.6) | | | |
| Hausa | 4 (26.7) | 11 (73.3) | | | |
| Others | 7 (50.0) | 7 (50.0) | | | |
| Marital status | | | | | |
| Married | 121 (53.3) | 106 (46.7) | 33.896 | 4 | < 0.001 |
| Separated/Divorced | 5 (12.8) | 34 (87.2) | | | |
| Widowed | 34 (53.1) | 30 (46.9) | | | |
| Living with a partner | 2 (11.1) | 16 (88.9) | | | |
| Never married | 6 (31.6) | 13 (68.4) | | | |
| Level of education | | | | | |
| Tertiary | 78 (56.5) | 60 (43.5) | 11.418 | 3 | 0.010 |
| Secondary | 38 (43.2) | 50 (56.8) | | | |
| Primary | 24 (39.3) | 37 (60.7) | | | |
| No formal education | 28 (35.0) | 52 (65.0) | | | |
| Occupation | | | | | |
| Professional/Snr Civil servants | 58 (65.2) | 31 (34.8) | 23.908 | 3 | < 0.001 |
| Drivers, Artisans | 43 (37.4) | 72 (62.6) | | | |
| Messengers, Petty Traders | 38 (51.4) | 36 (48.6) | | | |
| Unemployed | 29 (32.6) | 60 (67.4) | | | |
| Average income | | | | | |
| Above $60/month | 112 (55.2) | 91 (44.8) | 16.157 | 1 | < 0.001 |
| Below $60/month | 56 (34.1) | 108 (65.9) | | | |
| Social strata | | | | | |
| Low | 31 (27.0) | 84 (73.0) | 41.352 | 2 | < 0.001 |
| Middle | 45 (39.8) | 68 (60.2) | | | |
| High | 92 (66.2) | 47 (33.8) | | | |

**Table 3:** Relationship between socio-demographic characteristics and glycaemic control respondents'.

| Variables | Glycaemic Control, n (%) | | χ2 | Df | P value |
|---|---|---|---|---|---|
| | Good | Poor | | | |
| | (n = 168) | (n = 199) | | | |
| Duration of diagnosis | | | | | |
| ≤ 1 yr | 40 (50.0) | 40 (50.0) | 1.075 | 2 | 0.584 |
| 1 - 5 yrs | 77 (43.3) | 101 (56.7) | | | |
| > 5 yrs | 51 (46.8) | 58 (53.2) | | | |
| Number of co-morbidities | | | | | |
| Two or more | 34 (28.6) | 85 (71.4) | 27.094 | 2 | < 0.001 |
| One | 125 (56.8) | 95 (43.2) | | | |
| None | 9 (32.1) | 19 (67.9) | | | |
| Number of medications used | | | | | |
| Two | 16 (64.0) | 9 (36.0) | 3.589 | 1 | 0.058 |
| One | 152 (44.4) | 190 (55.6) | | | |
| Smoking | | | | | |
| Yes | 3 (11.1) | 24 (88.9) | 14.110 | 1 | < 0.001 |
| No | 165 (48.5) | 175 (51.5) | | | |
| Alcohol | | | | | |
| Yes | 9 (30.0) | 21 (70.0) | 3.276 | 1 | 0.070 |
| No | 159 (47.2) | 178 (52.8) | | | |
| BMI Category | | | | | |
| Underweight | 5 (38.5) | 8 (61.5) | 12.304 | 3 | 0.006 |
| Normal | 55 (39.3) | 85 (60.7) | | | |
| Overweight | 97 (54.8) | 80 (45.2) | | | |
| Obese | 11 (29.7) | 26 (70.3) | | | |

**Table 4:** Relationship between respondents' clinical parameters and glycaemic control.

| Variables | B | S.E. | Wald | OR (95% CI) | P value |
|---|---|---|---|---|---|
| Marital status | | | | | |
| Married | 0.429 | 0.816 | 0.277 | 1.536 (0.310 - 7.602) | 0.599 |
| Separated/Divorced | 0.176 | 1.001 | 0.031 | 1.192 (0.168 - 8.472) | 0.861 |
| Widowed | 1.259 | 0.938 | 1.803 | 3.522 (0.561 - 22.133) | 0.179 |
| Living with a partner | 0.360 | 1.193 | 0.091 | 1.434 (0.138 - 14.848) | 0.762 |
| Never married | | | | 1 | |
| Level of education | | | | | |
| Tertiary | -1.467 | 0.734 | 3.994 | 0.231 (0.055 - 0.972) | 0.046 |
| Secondary | -0.884 | 0.632 | 1.956 | 0.413 (0.120 - 1.426) | 0.162 |
| Primary | 0.318 | 0.590 | 0.291 | 1.375 (0.432 - 4.370) | 0.590 |
| No formal education | | | | 1 | |
| Occupation | | | | | |
| Professional/Snr CS | 1.702 | 0.732 | 5.409 | 5.486 (1.307 - 23.025) | 0.020 |
| Drivers, Artisans | 0.177 | 0.565 | 0.098 | 1.193 (0.394 - 3.611) | 0.754 |
| Messengers, Petty Traders | 0.542 | 0.575 | 0.889 | 1.720 (0.557 - 5.311) | 0.346 |

| | | | | | |
|---|---|---|---|---|---|
| Unemployed | | | | 1 | |
| Average income | | | | | |
| Above $60/month | -0.832 | 0.540 | 2.376 | 0.435 (0.151 - 1.253) | 0.123 |
| Below $60/month | | | | 1 | |
| Social strata | | | | | |
| High | 1.233 | 0.499 | 19.766 | 3.431 (1.291 - 9.124) | 0.013 |
| Middle | 2.849 | 0.641 | 6.107 | 17.263 (4.917 - 60.603) | < 0.001 |
| Low | | | | 1 | |
| Number of co-morbidities | | | | | |
| Two or more | 1.298 | 0.683 | 3.609 | 3.663 (0.960 - 13.978) | 0.057 |
| One | 0.367 | 0.729 | 0.253 | 1.444 (0.346 - 6.031) | 0.615 |
| None | | | | 1 | |
| Smoking | | | | | |
| Yes | -0.718 | 0.879 | 0.667 | 0.488 (0.087 - 2.732) | 0.414 |
| No | | | | 1 | |
| BMI Category | | | | | |
| Underweight | -0.214 | 0.957 | 0.050 | 0.808 (0.124 - 5.275) | 0.823 |
| Normal | -0.084 | 0.632 | 0.018 | 0.920 (0.267 - 3.172) | 0.895 |
| Overweight | 0.058 | 0.616 | 0.009 | 1.060 (0.317 - 3.541) | 0.925 |
| Obese | | | | 1 | |

**Table 5:** Logistic regression model: Glycaemic control as dependent variable.

Model summary: Nagelkerke R Square = 0.686; -2 Log likelihood = 241.859.

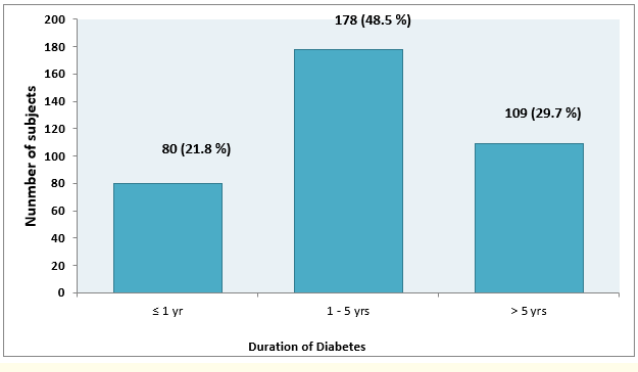


**Figure 1:** Bar chart depicting the duration of diabetes among respondents.

## Discussion

The present study characterized diabetic patients with regards to socio-demographic and clinical variables, and glycaemic control. The result of this study showed a mean FPG of 8.9 ± 3.7mmol/l. Among the respondents 164(44.7%) lived on less than two US dollars per day. Official exchange rate of ₦460 (Nigeria) to US $1. Nwankwo., *et al.* in a SE Nigerian study found that participants in their study earn even <$2 a day which is categorized as earnings for low income countries [22]. The demographic pattern of the respondents revealed that the mean age (SD) was 61.7 ± 11.4 years. Mean age of patients in this study was slightly higher than that reported by Chinenye and others (57.1 ± 12.3years) in the multicentre diabetic care study in Nigeria [23]. In this study, no respondent was less than forty years of age, though in the selection criteria, minimum age was thirty years. This is because T2DM is very rare before 30 years of age [20]. The association between older age and glycaemic control has been demonstrated in this study, as it shows a poor glycaemic control among the older age group and this is in agreement with some studies [2,24,25]. This may be due to co-morbidities and poor treatment adherence [24,25]. Also, physiological changes associated with advancing age can lessen the body's ability to dispose glucose. With advancing age, there might be a waning of the function of the $\beta$-cells of the pancreas, and some people develop other comorbidities that may affect glycaemic control. On the other hand, Ostgren., *et al.* and Kayar., *et al.* found no relationship between age and poor glycaemic control [26,27], and

other studies found that elderly people with diabetes had better glycaemic control than young people [28-30]. Elderly people are more likely to adhere to the management plan compared to young people who are more likely to be affected by the change in lifestyle and urbanization [29,31].

The female to male ratio was nearly equal at (1.01:1), which is similar to the finding in the Nigeria Diabetic Care study [32], but differed from the findings of other Nigerian studies that showed a male preponderance [20,33,34]. The female preponderance (50.4%) observed in this study is less than Adewolu's finding of 61.9% female in Benin city Nigeria [35]. Oyegbade and colleagues found that DM was more common in the females, with a male: female ratio of 1:1.7 [36]. The combined effect of a greater number of elderly women than men in most populations and the increasing prevalence of diabetes with age is the most likely explanation for this observation [35]. In this study, poor glycaemic control is common among men, similar to some studies [37,38]. Others reported that poor glycaemic control is common in women than men [24,39,40]. while on the other hand, Kellow., *et al.* found no significant gender differences of poor glycaemic control between men and women [41]. The inconsistency in the results of these studies may be explained in part by a variation in the methodology and heterogeneity between patients across the study population. Women are more likely to be supported by family members, relations and loved ones with financial assistance toward hospital visits than male patients. Men may also be more preoccupied with "making ends meet" to provide for the family, and not create time to come to the hospital [35].

Despite the development of evidence-based clinical practice guidelines and its recommendation for stringent glycaemic control to prevent complications, over 60% of T2DM patients are still not reaching the recommended glycaemic goals [2]. This could be due to vast host of factors that are associated with glycaemic control which are beyond the patient's and the health care worker's control. The number of respondents with good blood glucose control (<7.0mmol/l) in this study was 168(45.7%). The result of this study is higher than 29.1% reported in Ethiopia [42], but lower than 61.7% and 65,7% reported in Enugu by Iloh., *et al.* and Ibadan by Adisa., *et al.* respectively [43,44]. It is also lower than results from across Europe where the level of control was 62.6% as reported by Pablo-Velasco., *et al.* in their multi centre PANORAMA study [45]. This is much lower than 87.1% reported in United States [46]. This variation could be due to knowledge difference of respondents between developing and, developed countries, the presence of health insurance scheme, the difference in health insurance coverage, access to primary care and study location. Onyedibe reported that only 24% adult Nigerians are covered by National Health Insurance Scheme (NHIS) [47]. This is a probable reason for poor glycaemic control since many respondents cannot afford the cost of diabetic medications and do not enjoy any form of health insurance. This study was conducted in a rural setting as opposed to urban centers where Iloh and Adisa carried out their study. The literacy level and level of income coupled with out-of pocket financial cost may play a role.

Assessing the relationship between marital status and diabetes control in this study showed a significant association ($p < 0.001$). This is similar to findings from the National Health and Nutrition Examination Survey, United States, 2007–2010 which showed that married persons were more likely than unmarried persons to have good glycaemic control [46]. This can be explained by the fact that married couples are emotionally attached as reported by Awalom and colleagues [48]. This could be due to long-lasting support that married people obtain from their partners in helping to maintain and sustain good physical and mental health. However, this result needs to be interpreted with caution. Social and cultural factors come into play and it is difficult to generalize across settings. Also, the relationship between socio-economic status and diabetes control was found to be statistically significant in this study ($p < 0.001$), and this compares with the findings of Brown and Unadike [49,50]. Brown's study showed that low socio-economic status is consistently linked to worse health outcomes and individuals living in low-income areas have higher rates of mortality and morbidity related to chronic diseases while the poorest of the poor around the world have been known to have the worst health [49]. Weissman also stated that low economic status was associated with low access to health care [51,52]. A local study by Unadike and colleagues demonstrated a strong influence of low income and lower educational levels on poor diabetes outcomes as evidenced by ignorance and lack of relevant knowledge or skills required to maintain quality diabetes care and control [50]. Limited literacy may be associated with a decreased knowledge of medical conditions. It is worthy of note that those with higher education and socio-economic status have greater opportunities to access the limited resources. This study reported that number of co-morbidities ($p < 0.001$), smoking ($p < 0.001$) and BMI ($p = 0.006$) were among the parameters that is significantly related to glycaemic control, while the independent predictors of glycaemic control are level of education, occupation and social status. Higher education is facilitating

upward movement in socioeconomic status in African countries and it is likely that educated people have greater opportunities to access the region's limited resources for the control of T2DM [53].

Our study is a cross-sectional study causality cannot be assumed. This is a hospital based study and its generalization to the public should be taken with caution.

## Conclusion

From this study, control of diabetes was still not at the optimal level among the diabetes population. Independent predictors as reported in this study revolve round socio-economic status. Thus, for effective control of glycaemic control, education and empowerment to improve their socioeconomic status needs to be given priority.

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## Conflicts of Interest

There are no conflicts of interest.

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