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Rural and Urban Differences in the Prevalence of Type-2 Diabetes and the Associated Risk Factors: Analysis of a Population-Based Nation-wide Cross-sectional Survey in Bangladesh

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Dear Sir/Madam,

I am delighted to inform you that I, hereby, submit our original research paper titled '**Rural and Urban Differences in the Prevalence of Type-2 Diabetes and the Associated Risk Factors: Analysis of a Population-Based Nation-wide Cross-sectional Survey in Bangladesh'** in your journal for possible publication. I confirm that the manuscript has not been previously published elsewhere and has not been submitted elsewhere.

AUTHOR CONTRIBUTIONS

Conception and design of the study: Ashis Talukder, Sabiha Shirin Sara. Collection of data: Ashis Talukder, Sabiha Shirin Sara, Riaz Rahman. Data analysis, interpretation of results, and writing of the manuscript: Ashis Talukder, Sabiha Shirin Sara, Md. Tanvir Hossain, Chuton Deb Nath, Sadiq Hussain, Md. Nazmul Huda, Riaz Rahman. All the authors revised the manuscript critically for its intellectual content and approved the final version.

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Rural and Urban Differences in the Prevalence of Type-2 Diabetes and the Associated Risk Factors: Analysis of a Population-Based Nation-wide Cross-sectional Survey in Bangladesh

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Abstract

Objective: To estimate the prevalence of T2D in both urban and rural settings and identify the risk factors specific to each location.

Method: We explore the Bangladesh Demographic and Health Survey 2017-18 data sourcing from DHS website. A stratified two-stage sample was used for this survey where 7658 women and 7048 men aged 18 and older had found their blood glucose levels measured. Chi-square test and ordinal logistic regression were used to find the association between selected variables of both urban and rural settings with diabetes and prediabetes.

Results: The prevalence of diabetes is 10.8% and 7.4%, and pre-diabetes is 31.4% and 27% in urban and rural areas, respectively. The study identifies significant influences on diabetes of 55-64 age group in both urban and rural settings (Urban: AOR= 1.882, CI [1.462, 2.421]; Rural: AOR=1.874, CI [1.545,2.273]). The odds of diabetes were lower among highly educated participants, and higher among rich and overweight participants in both areas. In rural areas, the odds of diabetes is higher among caffeinators and physically inactive participants, whilst those show insignificant influence in urban areas. Moreover, the participants from urban areas show a considerable association between diabetes and hypertension.

Conclusion: Our findings urge the importance of location specific imminent preventive measures for T2D and prediabetes considering the concentration of the socio-demographic risk factors in both urban and rural contexts which essentially demand a sound public health policy to prevent the looming threat of public health sector.

Key Words: Type 2 Diabetes, Urban, Rural, Risk factors, Cross-sectional Survey, Bangladesh

Introduction

Diabetes is a chronic condition, a leading contributor to heart disease, stroke, blindness, neuropathy, kidney disease, and amputations. Diabetes typically presents in three ways:, Type 1 diabetes (T1D) is an autoimmune disease where the immune system assaults and destroys insulin-producing beta cells in the pancreas, whereas gestational diabetes (GDM) occurs during pregnancy as a result of hormonal changes that decrease insulin sensitivity. In addition, type 2 diabetes (T2D), also known as non-insulin-dependent diabetes, is brought on by the body's ineffective usage of the hormone insulin [1, 2]. Because of the impaired insulin ejection by pancreatic cells, which typically occurs against pre-existing insulin resistance in skeletal muscle, the liver, and adipose tissue, T2D is the category that affects most persons with diabetes [3]. Globally, the estimated diabetes prevalence is 10.5% in 2021 and is anticipated to increase to 12.2%

by 2045 [4]. Specifically, diabetes is affecting almost one in ten persons in Bangladesh [5], a public health concern.

Globally, the prevalence of T2D has been growing rapidly, especially in regions like Asia, the Middle East, and North Africa [6]. It is presumable that the burden of death and disability is significantly impacted by T2D consequences. Additionally, diabetes was listed as the tenth main factor affecting life expectancy [7]. T2D elevates the risk of dementia [8], cancer by around a two-fold margin [9, 10], and cardiovascular disease [11]. Depression and platelet dysfunction have also been linked to T2D [12, 13].

Due to the food habits and lifestyle of the region, T2D is spreading alarmingly throughout South Asia [14]. Bangladesh, one of the most densely populated countries, has the second-highest percentage of diabetic adults (6.31%) in the region [15]. In Bangladesh, 8.4 million individuals have diabetes in 2019; by 2045, that number is projected to be doubled to 15.0 million [16]. Pre-diabetes is predicted to affect 3.8 million individuals in Bangladesh in 2019 [16]. Pre-diabetes has been on the rise, according to most of the research done in Bangladesh [5], with low treatment and control rates [15]. Various unfavorable living situations, including crowded living conditions in slums specially in urban and associated stress, may contribute to increasing diabetes mellitus[17, 18]. Therefore, examining the variations in T2D prevalence and associated risk factors between an urban and rural population is intriguing.

In Bangladesh, there is a growing body of studies examining T2D and its risk factors. For example, several studies demonstrated education level, hypertension, financial status, physical activity, abdominal obesity, social class, family history, waist-hip ratio, and urbanization as some of the risk factors linked to diabetes in Bangladesh [19, 20, 21, 22]. Furthermore, other studies identified gender [10, 11, 8], high blood pressure [17], older age [23], way of life [13, 24], BMI [25], and ethnicity [26] as the risk factors for diabetes. Evidence also indicates an annual increase of diabetes rates in both urban (0.06%) and rural (0.05%) settings [27]. However, there are limited studies of diabetes prevalence and its associated risk factors using nationally representative surveys in urban and rural settings separately. Therefore, our study aims to measure the prevalence of T2D in both urban and rural settings and identify the risk factors specific to each location.

Methods

Data Source

Secondary data from the BDHS (Bangladesh Demographic and Health Survey) in 2017–18 were used in this study. The 2017–18 BDHS data were administered by the National Institute for Population Research and Training (NIPORT), and they are accessible on the DHS programme website [28]. The existing variable "Type of place of residence" served as the basis for our study's division of the dataset into urban and rural areas.

Sampling design

For both contexts, a stratified two-stage home sample was used. The Bangladesh Bureau of Statistics (BBS) took the sample in the initial stage using probability proportionate to size based on an area. In order to create a framework for sampling, a comprehensive household census was carried out in all chosen enumeration areas (EAs) in the second stage. 20,250 homes made up the 2017–18 sample, and 19,457 of those successfully completed the interview. The study was finished in 672 clusters after the removal of three due to erosion caused by floodwaters. This study found that 87% of women and 80% of men who were eligible to have their blood glucose levels measured had their blood glucose checked, out of 7658 women and 7048 men who were 18 years of age or older.

Selection of sample

Figure 1 shows the procedures of the selection of the samples. Among the total participants, 12300 were found as eligible for diabetes measurement. Then, we split the eligible participants into two portions: Urban and Rural based on the type of place of residence and finally conducted our analysis.

Dependent variable

The responders were instructed to fast for at least eight hours before to the test in order to test their fasting plasma blood glucose levels. The acquired value was converted to fasting plasma glucose equivalent values using the HemoCue Gucose 201 Dm system [29]. Then, in our study, we classified the fasting plasma glucose values into three categories in accordance with the recommendations of the World Health Organisation (WHO), and we called the dependent variable "Diabetes Status" in order to determine the presence of diabetes. Here, fasting blood glucose levels between 70 mg/dL (3.9 mmol/L) and 100 mg/dL (5.6 mmol/L) were regarded as normal, while those between 100 and 125 mg/dL (5.6 to 6.9 mmol/L) were classified as prediabetes and those above 126 mg/dL (7 mmol/L) as diabetic [20, 30].

Explanatory variables

Gender, age, education level, wealth index, smoking habit, consumption of caffeinated beverages, physical activity, hypertension, and BMI were explanatory variables. The selection of these factors and their categorisation was made after a thorough assessment of earlier studies from Bangladesh and other countries. Age is a numerical variable that has been broken down into the following four groups: youth (15–24 years) [31], prime working age (25–54 years), mature working age (55–64 years), and elder (65 years and above) [32]. Using an existing occupation type variable as a starting point, we developed the categorical variable "physical activity." Physically inactive respondents included those with desk-based occupations like doctors, attorneys, businesspeople, and the unemployed. Respondents who primarily engaged in physical labour, like farmers, fishermen, and manufacturing employees, were categorised as being physically active [33]. Another variable BMI was calculated by the DHS program. They collected data on heights and weights. Heights were measured standing up and weights were measured using SECA scales with a digital display. Then, bmi was calculated as weight in kilograms divided by the square of height in meters. To make our study more meaningful, we then categorized BMI into three categories. BMI with 18.5 kg/m^2 was considered underweight, BMI from 18.5 to 22.9 was normal, and BMI $\geq$ 23 was overweight [34]. Again, the measurement of blood pressure was taken at three different times, at about 10 min intervals, by trained health technicians. Then, the average of the measurements was granted as the final measurement for BP. The respondents with systolic blood pressure (SBP) < 140 and diastolic blood pressure (DBP) < 90 were considered to have no hypertension. If one violates the above rules, he/she has hypertension [35].

Statistical tools

The study requires model adjustment to detect risk factors for pre-diabetes and diabetes and raise awareness about lifestyle. In univariate analysis, a frequency distribution table was used to describe data.

Chi-square test was used to find the association between variables. In multivariable analysis, an ordinal logistic regression model was fitted. The data analysis was conducted using R (version 4.1.0). A 95% confidence interval was used to interpret the regression analysis with a significance level set at $p < 0.05$.

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This study receives no fund from any source. The dataset was fully accessible to all the authors and they were fully agree on the final submission for publication.

Results

Table 1 describes the basic characteristics of the participants for both urban and rural areas. Male participants (53.2%) were higher in urban areas, while female participants (55.3%) were higher in rural areas. Regarding education level, around 30% of participants in urban areas had secondary education, and for rural participants, more than 30% participants had primary education. Regarding caffeinated drinks, the urbanites had a higher percentage (9.6%), whereas smoking was higher among the rural people (17%). Comparatively, the percentage of hypertension (25.1%) and overweight (50.2%) was higher among urban participants, whereas rural participants (43%) were more physically inactive. Among the urban participants, 43.7% were richest but in rural areas, the percentage of richest participants was 9.8%. The percentages of diabetes were higher among urban participants (10.8%) than the rural participants (7.4%).

Table 2 further shows the association of socio-demographic variables with diabetes. Age showed a significant association with diabetes for both urban $(\chi^2 = 93.232, p < 0.01)$ and rural $(\chi^2 = 93.232, p < 0.01)$ areas. Participants of working age had the highest percentages of having diabetes compared to the other age groups for both urban and rural areas. The caffeinated drinks also showed a significant association with diabetes in both urban $(\chi^2 = 7.988, p < 0.05)$ and rural $(\chi^2 = 13.478, p < 0.01)$ areas. The percentage of diabetes is lower for the participants who took a caffeinated drink for both urban and rural areas with 13% and 7%, respectively. In both urban $(\chi^2 = 270.2, p < 0.01)$ and rural $(\chi^2 = 110.80, p < 0.01)$ areas, division was significantly associated with diabetes. For urban areas, Dhaka showed the highest percentages for both diabetes (30%) and pre-diabetes (31%); in contrast, for rural areas, Chittagong had the highest percentages for both diabetes (17%) and pre-diabetes (14%). Another risk factor associated with diabetes is hypertension that showed a statistically significant association $(\chi^2 = 80.643, p < 0.01)$ and $(\chi^2 = 76.271, p < 0.01)$ for both urban and rural areas, respectively. The prevalence of hypertension among diabetes participants is higher among urban participants (42%) than that of rural participants (39%). Moreover, body mass index, physical activity, and wealth status also showed a significant association with diabetes status in urban and rural areas. The prevalence of overweight is relatively higher among urban diabetes participants (65%) than rural diabetes participants (53%). Moreover, 83% of urban diabetes participants were physically inactive, but the prevalence is lower among rural participants (67%). Regarding the wealth status, the prevalence of diabetes was higher among the richest urban participants (59%) than the richest participants in rural areas (23%). The prevalence of pre-diabetes is higher among the poorest rural participants (24%) than the poorest urban participants (5%).

Table 3 shows the ordinal logistic regression analysis predicting diabetes in urban and rural areas. Age showed a significant association with diabetes in urban areas, where participants at primary working age, working age and older age were 1.350, 1.882, and 1.645 times more likely to have diabetes compared to the young, aged participants. In case of rural areas, participants at primary working age, working age, and older age were 1.561, 1.874, and 1.523 times more likely to develop diabetes than the young participants. Higher education levels showed a significant association with diabetes in urban and rural areas, where participants with higher education were 0.673 and 0.805 times less likely to develop diabetes, respectively, compared to the participants did not attend any school. Body mass index also showed a significant association with risk of developing diabetes. In fact, the overweight participants were 1.399 and 1.318 times more likely to develop diabetes compared to the underweight participants in urban and rural areas, respectively. Moreover, wealth status also showed a significant association with diabetes. Richer (2.647 and 1.397) and richest (4.165 and 2.152) participants showed a significant association with diabetes in both urban and rural areas, respectively. Moreover, middle participants were also 1.761 times more likely to develop diabetes compared to the poorest participants in urban areas, but it was not significant for rural areas. Physical activity showed a significant association for rural areas but showed an insignificant association for urban areas. It specified that physically inactive participants were 1.294 times more likely to develop diabetes compared to the physically active participants. Moreover, hypertension also showed a significant association with diabetes in urban areas but showed an insignificant association in rural areas. Participants who had hypertension were 1.256 times more likely to develop diabetes compared to the participants who did not have hypertension. The caffeinated drink also showed a significant association with diabetes in rural areas. Participants who took caffeinated drinks were 1.243 times more likely to develop diabetes than the participants who did not take any caffeinated drinks in rural areas.

Discussion

In both urban and rural locations, there was a significant correlation between participants' ages and diabetes. Results show that participants in both urban and rural settings who were older and of working age had a higher chance of developing diabetes than those who were younger. This may occur as a result of the interactions between rising insulin resistance, an unhealthy lifestyle, and their inability to satisfy daily physical activity recommendations. [36, 37].

According to previous study, those with low levels of education are more prone to acquire T2D [38]. As literacy may lessen the considerable difficulties and problems associated with this condition, our findings show that those with a high degree of education were less likely to have diabetes than participants with no education, both in urban and rural locations [39].

The body mass index (BMI) is a significant risk factor for developing diabetes. In both urban and rural patients in our study, there was a strong correlation between BMI and diabetes. Our results showed that participants with overweight were more likely to have diabetes in both urban and rural areas than participants with underweight. According to a US study [39], BMI plays a significant role in predicting the likelihood of acquiring diabetes, and a subsequent study from Bangladesh supports this conclusion [40].

Through the inverse connection shown in other studies [41], we found that caffeine use increases the probability of getting T2D in rural areas. As caffeine is unfamiliar in rural areas, the consumption of caffeine may disrupt the blood sugar regulation and this contributes the development of insulin resistance. However, caffeine-containing beverages had no significant association with diabetes in urban regions. This is possible due to urban individuals’ access to and preference for caffeinated beverages on regular basis and for this, over time, one’s body may develop tolerance to it.

Diabetes was also found to be highly associated with wealth status. In both urban and rural locations, diabetes was found to be substantially related with participants who were both richer and the richest. This happens because of the habitant of inactivity and excessive consumption of high-calorie foods among richer and richest participants. However, only in urban settings did it come to light that participants with middle wealth status had a strong association with diabetes. The risk of having diabetes may be influenced by the luxury and readily accessible or available life of urban middle-class individuals compared to rural people. [44,42]

In rural areas, it is apparent that physical exercise showed a substantial connection with diabetes. According to a study, regular exercise may lower the incidence of T2D [43]. Our findings concur with the earlier investigation. Compared to the physically active participants, the rural physically inactive participants were more likely to develop diabetes. The fundamental cause of this is that physically active people keep their bodies free of cholesterol. Moreover, physical activities may low the blood glucose level and boost ones body to sensitivity to insulin, countering insulin resistance [44].

In our investigation, systolic and diastolic blood pressure was utilized to assess whether it influences the risk of diabetes. Urban participants exhibit a strong association between hypertension and diabetes, whereas individuals in rural regions exhibit an insignificant association. Another investigation does not show any connection between diabetes and hypertension. [45]

Strength and limitations

Our study elucidates the compared scenario of diabetes between urban and rural areas including associated risk factors with prevalence and estimated values. This study includes the latest Demographic and Health survey data to estimate diabetes in Bangladesh. That disclose the strength of our study. Besides this strength, the study also has some limitations. Large number of the missing values and the constricted risk factors indicate one of the limitations of this study. Moreover, the information about the other types of diabetes are also unavailable. That can also be considered as another limitation of our study.

Generalisability

Our findings visualize the considerable distinct prevalence of T2D and prediabetes in urban and rural areas focusing socio-demographic associated risk factors like age, education level, wealth status, physical activity, consumption of caffeinated beverage, hypertension and BMI etc. The prevalence of T2D and prediabetes in urban setting 10.8% and 31.4% whereas in rural 7.4% and 27%, respectively which clearly indicates the rural setting have a lower prevalence of diabetes and prediabetes than urban setting. From our study, it is also apparent that the residents of urban environment are twice more likely to develop diabetes compared to the rural environment.

Our study outcomes impulse for the coordinating efforts of the epistemologists, public health researchers, policy makers, health practitioners, NGOs and other relevant stakeholders to formulate a sound public health policy considering the different prevalence in the urban and rural contexts. Preventive measures like effective health education program, awareness building campaign and most importantly a healthy public policy are must to curb the alarming rising rate of T2D and prediabetes. Polices should highlight the exorbitant associated factors of T2D among urban residents and rural residents separately and advocate the possible means of preventive interventions as both settings demand unique actions.

Conclusion

Our study substantially conclude that individuals live in metropolitan setting have a higher prevalence of diabetes than those from rural setting and major individuals in both urban (31.4%) and rural (27%) settings are identified as prediabetes which poses an imminent danger for the public health sector. Our findings echo with other studies that the percentage of diabetic patients will increase if an awareness building-campaign and some other preventive measures are not taken, considering both rural and urban situations to prevent the alarming rate. This study extends our knowledge to compare the prevalence of Type 2 Diabetes in both rural and urban settings. Epidemiologists, health policy makers and the researchers need to work together to develop a comprehensive programs to deal with the looming threat of T2D putting paramount importance on increasing public awareness.

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Tables

Table 1. Showing the frequency distribution of the selected variables

Covariates	Category	Urban		Rural	
		Frequency	Percentages	Frequency	Percentages

Gender	**Male**	2934	53.2	4114	44.7
	Female	2577	46.8	5081	55.3
Age	**Youth**	1176	21.3	1828	19.9
	Prime working	3327	60.4	5228	56.9
	Mature working	556	10.1	1105	12.0
	Older	452	8.2	1034	11.2
Education level	**No education**	1043	18.9	2668	29.0
	Primary	1467	26.6	2861	31.1
	Secondary	1636	29.7	2557	27.8
	Higher	1361	24.7	1099	12.0
Caffeinated drink	**No**	4317	90.4	7812	93.5
	Yes	461	9.6	541	6.5
Smoking Status	**No**	4137	86.6	6931	83.0
	Yes	641	13.4	1421	17.0
Division	**Barisal**	2966	9.2	6582	11.4
	Chittagong	4923	15.2	8413	14.6
	Dhaka	7409	22.9	5387	9.4
	Khulna	3949	12.2	7016	12.2
	Mymensingh	2541	7.9	7564	13.1
	Rajshahi	3497	10.8	7276	12.6
	Rangpur	3189	9.9	7526	13.1
	Sylhet	3817	11.8	7764	13.5
Hypertension	**No**	3577	74.9	6331	75.8
	Yes	1199	25.1	2024	24.2
BMI	**Underweight**	599	12.6	1609	19.5
	Normal	1762	37.1	3658	44.3
	Overweight	2382	50.2	2990	36.2
Physically Active	**Yes**	1359	75.1	3919	57.0
	No	4089	24.9	5203	43.0
Wealth status	**Poorest**	2951	9.1	15110	26.3
	Poorer	2698	8.4	14601	25.4
	Middle	4359	13.5	12688	22.1
	Richer	8187	25.4	9517	16.5
	Richest	14096	43.7	5612	9.8
Diabetes Status	**Normal**	2539	57.8	5182	65.5
	Pre-diabetes	1381	31.4	2138	27.0
	Diabetes	473	10.8	587	7.4

Table 2. Bivariate analysis of the selected variables for urban and rural areas

Covariates	Urban				Rural			
	Blood Glucose				Blood glucose			
	Normal	**Pre-diabetes n (%)**	**Diabetes n (%)**	**Chi-square (p-value)**	**Normal**	**Pre-diabetes n (%)**	**Diabetes n (%)**	**Chi-square (p-value)**
Gender								
Male	1152(45)	597(43)	200(42)	2.5953 (0.2732)	2198(42)	886(41)	265(45)	2.6134 (0.2707)
Female	1387(55)	784(57)	273(58)		2983(58)	1252(59)	322(55)	
Age								
Young	610(24)	272(20)	37(8)	**89.398 (<0.001)**	1129(22)	356(17)	50(9)	**93.232 (<0.001)**
Working	1523(60)	847(61)	300(63)		2910(56)	1279(60)	344(59)	
Primary working	210(8)	146(11)	74(16)		582(11)	273(13)	109(19)	
Older	196(8)	116(8)	62(13)		560(11)	230(11)	84(14)	
Education level								
No education	498(20)	268(19)	87(18)	5.0437 (0.5382)	1513(29)	599(28)	165(28)	3.8792 (0.693)
Primary	697(27)	390(28)	124(26)		1619(31)	678(32)	197(34)	
Secondary	782(31)	396(29)	159(34)		1430(28)	610(29)	166(28)	
Higher	562(22)	327(24)	103(22)		619(12)	251(12)	59(10)	
Caffeinated drink								
No	2323(92)	1258(91)	412(87)	**7.9886 (0.018)**	4893(95)	1974(92)	545(93)	**13.478 (0.001)**
Yes	215(8)	123(9)	59(13)		282(5)	163(8)	42(7)	
Smoking status								
Yes	2207(87)	1215(88)	405(86)	1.5009 (0.4721)	4326(84)	1788(84)	478(82)	1.6516 (0.4379)
No	331(13)	166(12)	66(14)		849(16)	349(16)	108(18)	
Division								
Barisal	237(9)	140(10)	46(10)	**270.2 (<0.01)**	537(10)	256(12)	65(11)	**110.8 (<0.01)**
Chittagong	368(14)	198(14)	66(14)		633(12)	302(14)	100(17)	
Dhaka	298(12)	425(31)	142(30)		400(8)	256(12)	83(14)	
Khulna	394(16)	163(12)	65(14)		743(14)	271(13)	70(12)	
Mymensingh	243(10)	96(7)	30(6)		691(13)	271(13)	66(11)	
Rajshahi	369(15)	123(9)	46(10)		745(14)	255(12)	75(13)	
Rangpur	327(13)	117(8)	38(8)		808(16)	245(11)	47(8)	
Sylhet	303(12)	119(9)	40(8)		624(12)	282(13)	81(14)	
Hypertension								
No	1967(78)	1034(75)	273(58)	**80.643 (<0.01)**	3984(77)	1640(77)	357(61)	**76.271 (<0.01)**
Yes	569(22)	347(25)	198(42)		1193(23)	498(23)	230(39)	
BMI								
Underweight	376(15)	147(11)	35(8)	**87.431 (<0.01)**	1070(21)	391(19)	67(12)	**91.688 (<0.01)**
Normal	1024(41)	486(35)	126(27)		2323(45)	898(43)	206(36)	
Overweight	1114(44)	740(54)	302(65)		1726(34)	822(39)	303(53)	
Physical activities								
Yes	750(30)	350(25)	82(17)	**32.896 (<0.01)**	2400(47)	883(41)	193(33)	**46.357 (<0.01)**
No	1776(70)	1025(75)	389(83)		2761(53)	1247(59)	389(67)	
Wealth status								
Poorest	300(12)	64(5)	18(4)	**227.21 (<0.01)**	1396(27)	514(24)	99(17)	**184.27 (<0.01)**
Poorer	276(11)	84(6)	17(4)		1365(26)	488(23)	106(18)	
Middle	444(17)	176(13)	48(10)		1189(23)	457(21)	121(21)	
Richer	654(26)	357(26)	109(23)		790(15)	382(18)	125(21)	
Richest	865(34)	700(51)	473(59)		441(9)	297(14)	136(23)	

Table 3. Ordinal logistic regression table for urban and rural areas

Variables		Urban				Rural			
				95% C.I				95% C.I	
		AOR	p-value	Lower	Upper	AOR	p-value	Lower	Upper
Gender									
	Male (ref)	-	-						
	Female	1.063	0.344	0.937	1.206	0.959	0.408	0.869	1.059
Age									
	Youth (ref)	-	-						
	Prime working	1.350	**<0.001**	1.143	1.597	1.561	**<0.001**	**1.358**	**1.796**
	Mature working	1.882	**<0.001**	1.462	2.421	1.874	**<0.001**	**1.545**	**2.273**
	Older	1.645	**<0.001**	1.251	2.162	1.523	**<0.001**	**1.237**	**1.875**
Education level									
	No education (ref)	-	-						
	Primary	1.004	0.966	0.835	1.208	1.099	0.139	0.969	1.248
	Secondary	0.828	0.056	0.683	1.005	0.992	0.911	0.861	1.143
	Higher	0.673	**<0.001**	0.539	0.839	0.805	**0.028**	**0.663**	**0.977**
Caffeinated drink		-	-						
	No (ref)								
	Yes	1.093	0.416	0.881	1.354	1.243	**0.025**	**1.026**	**1.501**
Smoking status									
	No (ref)	-	-						
	Yes	0.977	0.810	0.806	1.182	0.985	0.827	0.864	1.123
BMI									
	Underweight (ref)	-	-						
	Normal	1.093	0.400	0.889	1.348	1.098	0.166	0.962	1.254
	Overweight	1.399	**0.002**	1.137	1.727	1.318	**<0.001**	**1.143**	**1.521**
Wealth status									
	Poorest (ref)	-	-						
	Poorer	1.257	0.186	0.896	1.768	0.973	0.698	0.849	1.116
	Middle	1.761	**<0.001**	1.311	2.382	1.072	0.336	0.9302	1.236
	Richer	2.647	**<0.001**	2.009	3.519	1.397	**<0.001**	**1.196**	**1.632**
	Richest	4.165	**<0.001**	3.156	5.549	2.152	**<0.001**	**1.800**	**2.572**
Physical activity									
	Yes (ref)	-	-						
	No	1.092	0.253	0.939	1.269	1.294	**<0.001**	**1.169**	**1.433**
Hypertension									
	No (ref)	-	-						
	Yes	1.256	**0.002**	1.086	1.452	1.094	0.125	0.975	1.226

Note. AOR. Adjusted odds ratio; BMI. Body mass index

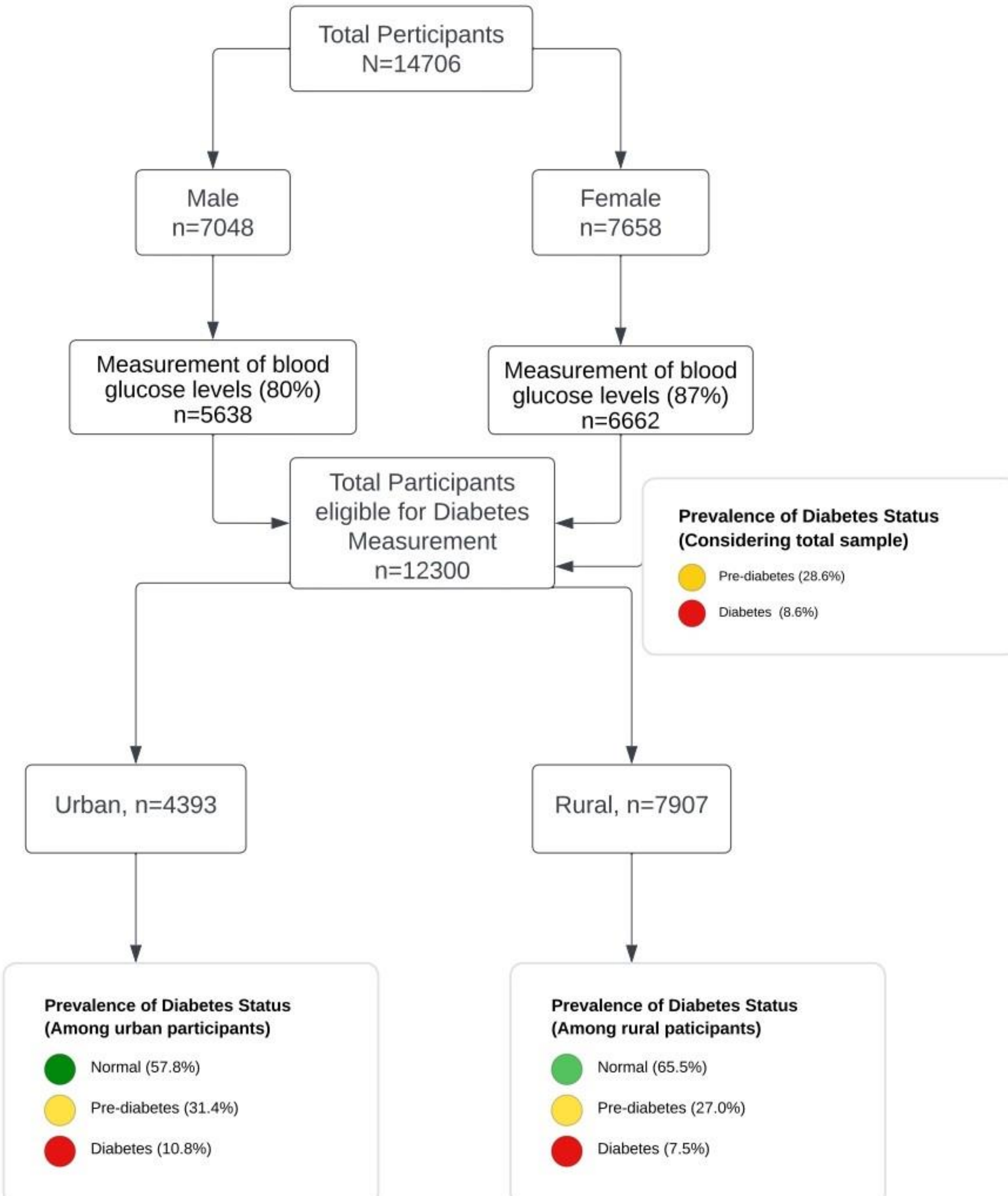

Figure 1: Flow chart showing sample selection procedure

Other