JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Prevalence of Diabetes Mellitus among the Garo Population in Bangladesh

Ummy Salma Munni[1], Professor Dr. Khaleda Islam[2]

1. PhD Researcher, Institute of Nutrition and Food Science (INFS), University of Dhaka
2. Director, Institute of Nutrition and Food Science, University of Dhaka.

Corresponding Author: Ummy Salma Munni[1] 01799327927 **Email**: owrin_bd@yahoo.com

Abstract

Diabetes mellitus is one of the most common non-communicable diseases which has a major impact on public health worldwide. It causes vast contribution to morbidity and mortality worldwide. Several factors like age, sex, BMI, hypertension, dyslipidemia may be potentially controlled or minimized leading to huge benefits in the management and prevention of diabetes. In Bangladesh, there are many studies related to diabetes among general peoples but, there have a few studies have been conducted among indigenous population. Garos are one of the important ethnic groups in Bangladesh but major non communicable disease, diabetes has not been assessed among them. Under this context, the present study was undertaken to assess of diabetes mellitus condition of Garo population in Bangladesh**.** This is an observational analytic study with a cross-sectional design which was conducted among 289 Garo peoples from several areas of Bangladesh. The result of the study shows that 12.1% of the study population have family history of diabetes and mean fasting blood glucose level (mmol/L) were 5.12± 2.20. The study assessed that 86.1% of study population was Normoglycemic, 8.7% had Impaired Fasting Glucose and 5.2% was diabetic subjects. Among the study population, 97.2% of study subjects did not take insulin and 2.8% took insulin among diabetic patients. The study also revealed Gender based distribution of diabetes mellitus among male and female where 8.2% of the study population were female who manifested diabetes mellitus based FBG (Fasting Blood Glucose level), where male only 3.9%. Based on post prandial glucose level, almost similar prevalence of diabetes among male 5.3% and female 5.5%. There was a positive correlation with FBG and waist-hip-ratio. It is necessary to run epidemiological studies on indigenous people which may help to identify several clues of disease pathogenesis as these people lead a different genetic and lifestyle. Here, the study is an approach to influence quality of lifestyle against non-communicable disease such as diabetes.

Key words: Diabetes Mellitus, Garos, FBG, IFG, PPG, IG

Introduction:

Diabetes mellitus, the most common non-communicable disease, is a group of metabolic disorders characterized by a high blood sugar level due to mal production of insulin over a prolonged period of time. According to American Diabetes Association, it usually does not cause symptoms but people with diabetes often have obesity, dyslipidemia with high triglycerides or low HDL cholesterol, and hypertension. Prediabetes is more accurately considered an early stage of diabetes often occur before the diagnosis of diabetes.

In South Asia non communicable diseases are increasing which have developed a standardized rate of mortality where diabetes makes a large contribution (Mohiuddin, A. K. 2019). According to International Diabetes Federation

estimation, about 90 million adults are living with diabetes in South-East Asia Region in 2021 and it assumed to increase to 113 million by 2030 and 152 million by 2045 (IDF Diabetes Atlas 10th Edition 2021). A recent study has estimated that ten million people have diabetes in Bangladesh (Chaity, A. J. 2017) where prevalence of diabetes and prediabetes is 7.8% and 10.1% respectively (Akhtar, S., Nasir, J. A., et al., 2020). There are about 35 smaller groups of indigenous communities in Bangladesh. Among them the Garo is one of the largest indigenous communities of Bangladesh. They live in the north-eastern parts of the country especially in Gazipur, Mymensingh, Netrokona, Tangail, Sheerpur, Jamalpur and some in Sylhet district (Jalil, M. et. al., 2012). Primordial farming and different way of lifestyle represent them as a vital focal point of research. These ethnic groups including Garo tribe are susceptible to various types of health problem due to lack of accessibility in advanced technology for diagnosis and absence of appropriate chronic disease management facilities (Canadian Diabetes Association, 2022). Usually, Indigenous people are industrious by nature and do hard work. Therefore, it is assumed that they should not be susceptible to diabetes but the occurrence of diabetes is associated with their dietary habits. Several contemporary Researches found that few unhealthy practices such as tobacco use, improper diets and alcohol consumption are becoming the main risk factors of prediabetes and diabetes mellitus among indigenous people in Bangladesh due to lack of low health literacy, unawareness about the severity of disease and lack of advocacy for health intervention program (Tabassum & R. 2016). Indigenous peoples who are affected with diabetes at a younger age (Oster RT et al., 2012), face higher rates of complications, and experience poorer treatment outcomes (Jiang Y et al., 2014; Komenda P et al., 2016). Since diabetes invites others non communicable diseases such as cardiovascular disease, kidney disease, and stroke (Papatheodorou, K., Papanas et al.,2016), guidelines regarding diabetes managements and research activities among Garo population is an urgent need for upcoming days. Unfortunately, no nationally representative epidemiological analysis of the prevalence of Diabetes and prediabetes condition has been conducted among indigenous people in Bangladesh. Previous researches have been restricted to particular rural or urban regions or a specific gender or had a non-adequate sample size. Therefore, the study's goals were to obtain a representative assessment of the Diabetic and prediabetic patients among Garo community in the risk group in Bangladesh.

2. Materials and Methods:

2.1. Study Setting: The study was conducted in Mymensingh and Tangail districts in Bangladesh.

2.2. Study Design, Study Period, and Sample Size

An observational analytic study with a cross-sectional design was conducted among 289 rural Garo adults aged between 18- 60 years from March 2021 to April, 2022.

2.3. Sampling Technique

It was an observational analytical study conducted under a cross-sectional design. Recruited through a purposive sampling, the subjects comprised of 289 Garos (age 18-60 yrs.) located in a rural area (Modhupur) of Tangail district. Anthropometric measurements such as Body Mass Index, Waist-Hip Ratio were done by standard methods. Fasting blood glucose was estimated in all subjects and a standard OGTT as per WHO Study group criteria was done in some cases. Serum glucose at fasting and 2h after 75g oral glucose load, were estimated by enzymatic methods using a semi-autoanalyzer. Data were analyzed by univariate and multivariate statistical techniques, as appropriate, using SPSS for Windows v23.

2.4. Exclusion criteria:

i)Garo adults above 60 years old, ii) Severe ill subjects due to other concurrent diseases. iii) Subjects with mental disorders, iv) Pregnant women, v) Adults unwilling to participate in the study.

2.5. Data Collection Procedure

Demographic, Anthropometric and biochemical data were collected by learned personnel by person-to-person observation**.** In anthropometric measurements height, weight and Waist-hip ratio were measured, and in biochemical analysis Fasting Blood Glucose (FBG) level (PPG) were measured for individual respondents.

2.6. Data Analysis

Data were entered, checked, cleaned and analyzed using SPSS software (Version 23.0). An analytical descriptive statistical approach was used to elaborate several characteristics of study subjects. Bivariate and multivariate analysis was conducted for checking association. Correlation was conducted using odd ratio where the p value less than 0.05 considered as significant.

3. Results

Table 1: Sociodemographic characteristics of the study subjects (n=289)

Variables	Number	Percentage (%)
Sex		
Male	**104**	**36**
Female	**185**	**64**
Religion		
Hindu	**6**	**2.1**
Buddhist	**41**	**14.2**
Christian	**242**	**83.7**
Marital Status		
Married	**257**	**88.9**
Unmarried	**26**	**9**
Widowed	**6**	**2.1**
Education		
Illiterate	**68**	**23.5**
Primary	**84**	**29.1**
SSC	**93**	**32.2**
HSC	**29**	**10**
Graduate	**12**	**4.2**
Post Graduate	**3**	**1**

Table 1 depicts demographic information among study population where 36% was male and 64% was female. Majorities of the respondents were Christian community (83.7%) and 2.1%, 14.2% of study population belong to

Hindu, Buddhist respectively**.** 88.9%, 9% and 2.1% of the study population were married, unmarried and widow respectively.

There was little impact on education among study population. If we see to the education level of the respondents: a big portion (23.5%) of them were illiterate, 29.1% have completed their primary education, 32.2% up to SSC, 10% up to HSC and rest 4.2% were Graduate and 1% were Post graduate.

Table 2: Anthropometric & clinical characteristics:

Variables	Mean ± SD
Age (yrs)	43.24 ± 14.34
BMI (kg/m^2)	23.39 ± 5.74
Waist hip ratio	81 ± 0.13

Table 2 shows the mean age of the subjects were 43.24 years with a standard deviation of 14.34years. The mean Body Mass Index (BMI) of the subjects was 23.39 with the standard deviation 5.74 and the mean Waist-Hip Ratio was 81 (± 0.13).

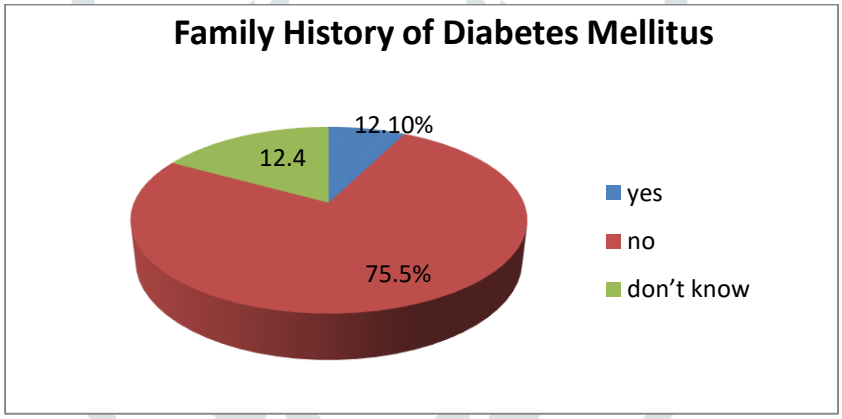

Figure 1: Family History of Diabetes mellitus among the Study Subjects (n=289)

Figure 1 demonstrates that family history of diabetes was 12.10 % and 75.5% of study population had no family history of diabetes. On the other hand, 12.4% of study population didn't know whether they had family history of diabetes mellitus or not.

Table 3: Fasting Serum Glucose (FBG) of the respondents.

Variables	Mean ± SD
FBG (mmol/L) (n=289)	5.12 ± 2.20
2-hr PPG (mmol/L) (n=222)	6.63 ± 2.94

Table 3 represents the mean fasting blood glucose level (mmol/L) were 5.12 with the standard deviation 2.20 and 2 hrs post prandial glucose were 6.63 with the standard deviation of 2.94 among the study subjects.

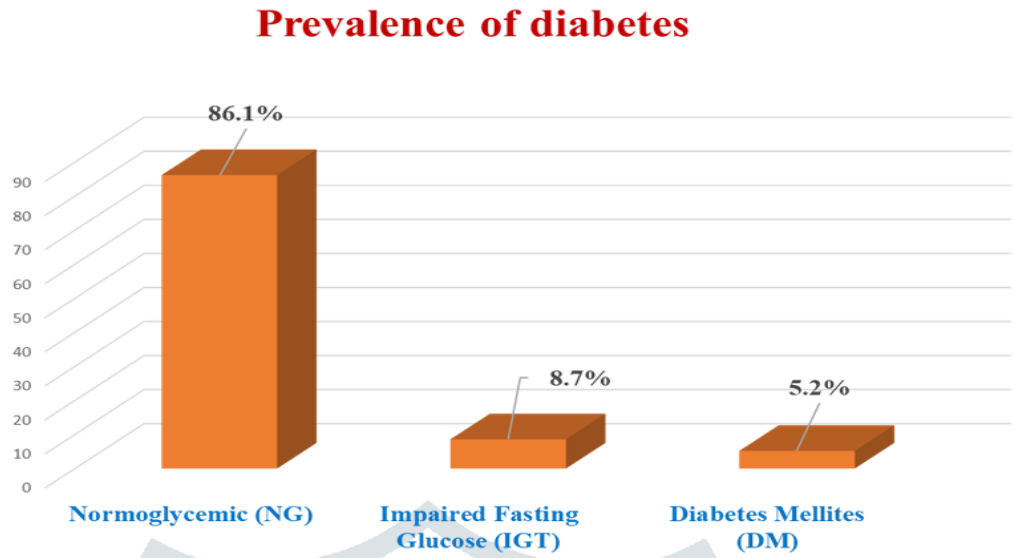

Figure 2: Prevalence of diabetes among the study subjects

Figure 2 shows the prevalence of diabetes mellitus among the study subjects. Diabetes mellitus (DM) was found to be 5.2% and that of IGT was 8.7% among all the subjects, normoglycemic was 86.1%.

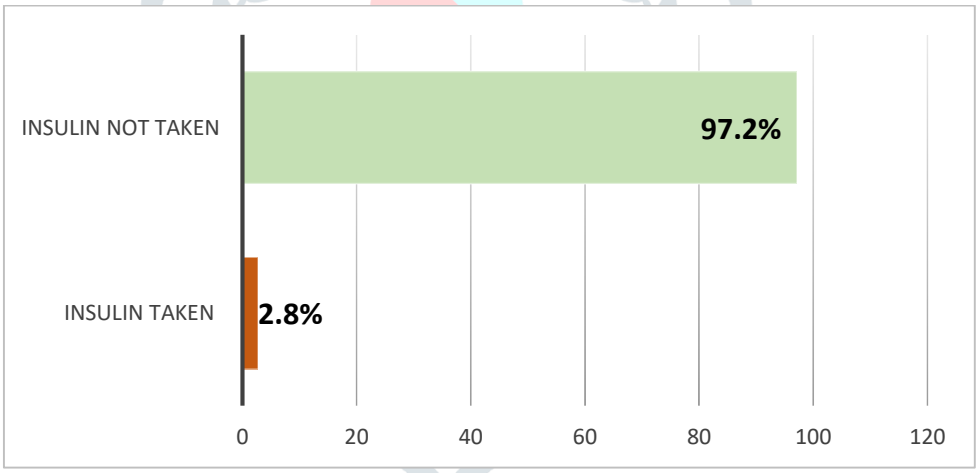

Figure 3: History of Insulin dependency among study population.

Figure 3 depicts insulin dependency among study population where 97.2% of study subjects did not take insulin and 2.8% took insulin among diabetic patients.

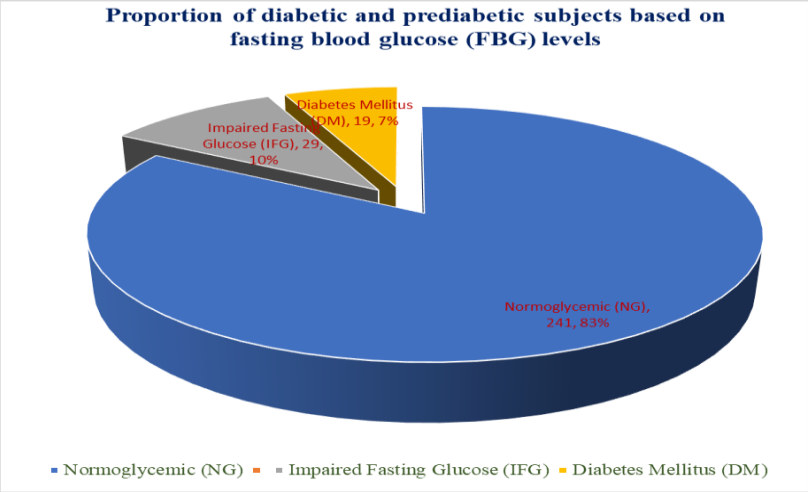

Figure 4: Proportion of diabetic and prediabetic Subjects based on fasting blood glucose (FBG) Levels

Figure 4 shows the proportion of diabetic and prediabetic Subjects based on fasting blood glucose (FBG) Levels (PPG). Based on FBG, 7% were diabetic and 10% had Impaired fasting Glucose (IFG).

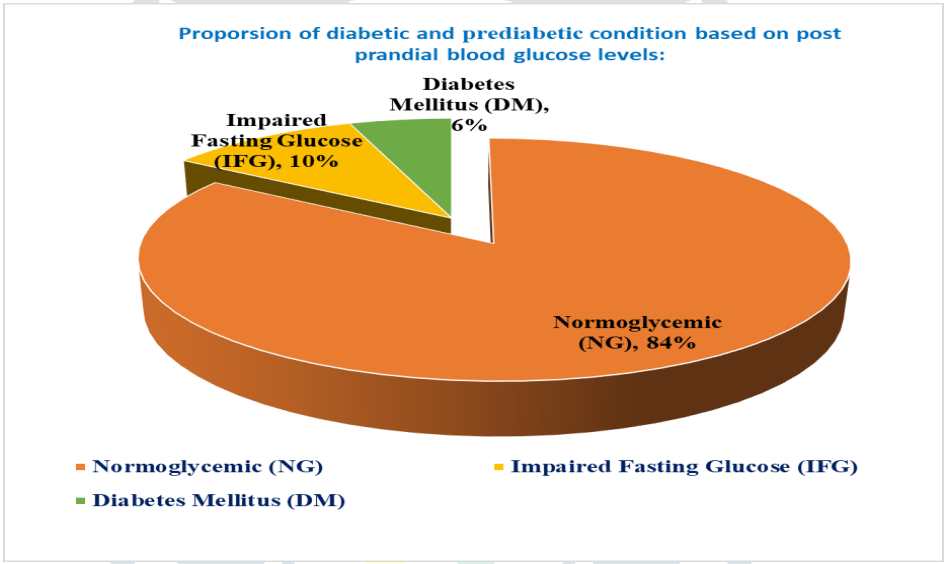

Figure 5: Proportion of diabetes mellitus Subjects based on Postprandial Blood Glucose Levels (PPG):

Figure 5 shows the proportion of diabetic subjects according to post prandial blood glucose among the study subjects. Here we see 6% of the respondents have the condition of diabetic and 10% have Impaired fasting glucose level and rest (84%) are non-diabetic subjects.

Table 4: Based on fasting blood glucose (FBG) and post prandial blood glucose (PPG) gender wise distribution of diabetes mellitus groups among the subjects:

Variables		Sex of the respondents		Total	χ2	P Value
		Male N (%)	Female N (%)			
FBG	Normoglycemic (NG)	90 (86.4)	151(82.1)	241 (83.6)	1.967	0.187
	Impaired Fasting Glucose (IFG)	10 (9.7)	19 (9.8)	29 (9.8)		
	Diabetes Mellitus (DM)	4 (3.9)	15 (8.2)	19 (6.6)		
	Total	4 (3.9)	185 (100)	289 (100)		
PPG	Normoglycemic (NG)	78 (83.0)	109 (85.2)	187 (84.2)	0.316	0.427
	Impaired Fasting Glucose (IFG)	11 (11.7)	12 (9.4)	23 (10.4)		
	Diabetes Mellitus (DM)	5 (5.3)	7 (5.5)	12 (5.4)		
	Total	94 (100)	128 (100)	222 (100)		

Results were expressed as number (%), χ2experiment was conducted and p<0.05 was level of significance

Table 4 shows the Distribution of diabetic and prediabetic among male and female. Here No significant statistical difference was observed between males and females. But this table shows based on fasting women were comparatively more diabetic (8.2%) and prediabetic (9.8) than men (3.9%), (9.7). Whereas based on PPG male, female almost similar.

Table 5: Correlation among BMI, WHR, Fasting of the subjects.

Variables	BMI	Waist-hip ratio	Fasting
BMI	**1**	**.113**	**.077**
		.249	**.435**
		289	**289**
Waist-hip ratio		**1**	**.228***
			.019
			289
Fasting			**1**

Table 5 represents the positive correlation of waist hip ratio with fasting blood glucose level.

4. Discussion

Garo population bears a different lifestyle due to different environment and societal structure. Thus, educational system of these indigenous people is somehow different from non-indigenous people. According to the study findings educational status, there was little impact on education among study population. Similar results have been also found from educational status of Garo people living in Meghalaya, India (Sultana et al., 2017). In case of family history, the leading non-communicable diseases of this study found 12.1% of study population have family history of diabetes. This may be due to little knowledge about the disease. A previous study of Garo population in Madhupur upazila, its results showed 7.5% had the family history of diabetes. (Chowdhury, M., Hoque, A., et al., 2013). So, family history of diabetes is increasing day by day.

To find out diabetes mellitus among Garo people, this study revealed the over all prevalence of diabetes mellitus was 5.2%, and 8.7% had Impaired Fasting Glucose. Where, 7% was diabetes and 10% had prediabetes according to fasting blood glucose level and 6% have diabetes and same 10% had impaired fasting glucose(prediabetes) according to post prandial blood glucose level that means pre diabetic conditions are prevailing more than diabetic conditions. But this is a predictor that pre diabetic patients can prevent diabetes by maintain good lifestyle. There is evidence from a 5-Year Perspective Study (2009–2014) in Iran where the incidence of diabetes among healthy individuals present in Phase 1 is 21.9 per 1000 person-years and prediabetes incidence is 40.8 per 1000 person-years and after a 5-year period, 50.2% became healthy of all pre diabetics in phase 1, 33.1% remained pre diabetic, and 16.8% changed to diabetics (Latifi, & S. M. et al., 2016). In association with diabetes and nutritional status, this study found that there is a positive correlation with waist hip ratio with diabetes occurrence. There was a similar finding from Lau, S. L., et al., 2009 and Nayak, V. K. R et al., 2018.

5. Conclusion

Garo people belongs to specialized lifestyle than usual lifestyle of nonindigenous people such that their physical activity, food habits, way of living are far different from other nonindigenous people. Garo people though exhibits more physical activity than nonindigenous people, they sometimes become more susceptible to various non communicable diseases such as heart diseases, diabetes etc. and this may be due to their ignorance about the disease or due to poor contribution from Govt. side to make their educational system more effective. Again, there are very few research activities on indigenous people. But more research activities and epidemiological studies on Garo as well as other indigenous population can provide more information and clues to identify several disease pathogenesis and risk factors and this may help them to lead a better quality of lifestyle.

References

Akhtar, S., Nasir, J. A., Sarwar, A., Nasr, N., Javed, A., Majeed, R., ... & Billah, B. (2020). Prevalence of diabetes and pre-diabetes in Bangladesh: a systematic review and meta-analysis. *BMJ open*, *10*(9), e036086. https://doi:10.1136/ bmjopen-2019-036086

American Diabetes Association. (2017). 8. Pharmacologic approaches to glycemic treatment. *Diabetes care*, *40*(Supplement_1), S64-S74. https://doi.org/10.2337/dc17-S011

Chaity, A. J. (2017). Obesity blamed for alarming rise in childhood diabetes. *Dhaka Tribune, Bangladesh*. https:// www.dhakatribune.com/health/2017/11/13/obesity-childhooddiabetes-alarming

Chowdhury, M., Hoque, A., & Haque, M. (2013). Geriatric health problems of the elderly Garo people in Madhupur Upazila of Tangail District.

Hossain, M. (2019). Comparison of diabetes knowledge and self-efficacy in diabetes management among the urban people and the people from Garo tribe in Mymensingh division (Doctoral dissertation, Brac University).

Jiang, Y., Osgood, N., Lim, H. J., Stang, M. R., & Dyck, R. (2014). Differential mortality and the excess burden of end-stage renal disease among First Nations people with diabetes mellitus: a competing-risks analysis. *CMAJ*, *186*(2), 103-109.

Komenda, P., Lavallee, B., Ferguson, T. W., Tangri, N., Chartrand, C., McLeod, L., ... & Rigatto, C. (2016). The prevalence of CKD in rural Canadian Indigenous peoples: results from the First Nations Community Based Screening to Improve Kidney Health and Prevent Dialysis (FINISHED) screen, triage, and treat program. *American Journal of Kidney Diseases*, *68*(4), 582-590.

Latifi, S. M., Karandish, M., Shahbazian, H., & Hardani Pasand, L. (2016). Incidence of prediabetes and type 2 diabetes among people aged over 20 years in ahvaz: a 5-year perspective study (2009–2014). Journal of diabetes research, 2016.

Mohiuddin, A. K. (2019). Diabetes fact: Bangladesh perspective. International Journal of Diabetes Research, 2(1), 14-20. https://doi.org /10.17554/j.issn.2414-2409.2019.02.12

Nayak, V. K. R., Raghurama Nayak, K., Vidyasagar, S., & Kamath, A. (2018). Body composition analysis, anthropometric indices and lipid profile markers as predictors for prediabetes. PloS one, 13(8), e0200775.

Oster, R., Johnson, J. A., Balko, S., Svenson, L., & Toth, E. L. (2012). Increasing rates of diabetes amongst status Aboriginal youth in Alberta, Canada. International journal of circumpolar health, 71(1), 18501.

Papatheodorou, K., Papanas, N., Banach, M., Papazoglou, D., & Edmonds, M. (2016). Complications of diabetes 2016. Journal of diabetes research, 2016. https://doi.org/10.1155/2016/6989453

Stoddard, P., Handley, M. A., Bustamante, A. V., & Schillinger, D. (2011). The influence of indigenous status and community indigenous composition on obesity and diabetes among Mexican adults. *Social science & medicine*, *73*(11), 1635-1643. https://doi.org/10.1016/j.socscimed.2011.09.006

Sultana, P., & Sangma, S. M. (2017). Educational status of youth in age group of 18-28 years: an evaluative study on east Garo hills, Meghalaya. International Journal of Research in Management & Social Science, 5(1), 56.