

Risk Factors of Type 2 Diabetes among Low-Income Population in Dhaka City

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Abstract

Diabetes mellitus is serious public health challenges around the world. This leads to life-threatening and expensive complications among developing countries, affecting disproportionately the low-income population. The prevalence of type 2 diabetes has increased dramatically in countries of all income levels over the past 3 decades. The study focused on estimating and identifying risk factors of type 2 diabetes among low-income people residing in Dhaka city. A cross-sectional analytical hospital-based study design was carried out. Subjects were randomly selected from previous diagnostic information and medical records. A well-designed semi-structured pre-tested and modified questionnaire was used to collect the required data from the study subjects. The findings of this study indicate that socioeconomic position is closely associated with several behavioral and metabolic factors related to type 2 diabetes among adults attending the study setting. Multivariable analysis of the study population indicates that education, body mass index (BMI), dietary patterns, and certain lifestyle behaviors including alcohol consumption and street-food intake were independently associated with income status, whereas age showed no significant effect. Lower-income participants were characterized by higher carbohydrate consumption and limited health awareness. These findings suggest that type 2 diabetes risk is influenced by both behavioral and socioeconomic determinants: higher-income groups face increased risk through lifestyle excesses, while lower-income groups are affected by constrained resources and limited preventive practices.

Keywords: Risk factor, Type 2 diabetes, Low income, Dhaka city

Background

Morbidity and mortality have increased over the last few decades in Bangladesh due to NCD risk factors, especially type 2 diabetes. In Bangladesh, 8.4 million adults lived with diabetes in 2019 and projected to be almost double by 2045 (IDF diabetes Atlas, 2019). Population with lower socioeconomic status, vulnerability, and social deprivation get illness and pass away in a shorter time than populations with higher socioeconomic status due to exposure to NCD risk factors (WHO, 2023). Besides, socioeconomic conditions, environmental factors, and NCD risk factors may have a link with physical inactivity and lifestyle factors which are important for designing health-promoting programs for the elderly people groups residing in Dhaka city. This is why the effect of NCD risk factors needs to be studied at the community

level in urban areas. Type 2 diabetes and its complications constitute a major public health problem worldwide, affecting almost all populations in both developed and developing countries with high rates of diabetes-related morbidity and mortality. The prevalence of type 2 diabetes is increasing rapidly and a high prevalence rate has been observed in developing countries and populations undergoing “westernization” or modernization. Multiple risk factors for diabetes, delay in diagnosis until micro- and macro-vascular complications, life-threatening complications, failure of current therapy, and the financial cost of treating this disease make it necessary to develop new efficient therapeutic strategies and appropriate preventive measures to control type 2 diabetes. (Wu Y, 2014). Type 2 diabetes and their risk factors have been linked to unhealthy food consumption

(BMC Nutrition, 2023). Besides, People with lower incomes have a higher risk of many diseases including coronary heart disease, diabetes mellitus, and cancer than people with higher socio-economic status (Tawakol et al, 2019). However, there is a substantial knowledge gap regarding diabetes that have been linked with unhealthy diet and poverty and the impact of physical exercise in maintaining normotensive blood pressure specifically among low-income people. The diabetes risk factors among low-income people in a densely populated urban area like Dhaka city are not evidenced. The present study fills this knowledge gap systematically.

Materials and Methods

This study focused risk factors of type 2 diabetes among high & low-income people living in Dhaka city at a single point in a specified time. Considering time period and resource availability, cross-sectional analytical hospital-based study design was most feasible for this study. Respondent's self-reported responses were recorded for socio-demographic factors, diabetes through interviews. People who were attended at Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic

Disorders (BIRDEM) for treatment purpose irrespective of gender was included in the study. This study was conducted at Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM), Shahbagh, Dhaka. A simple random sampling technique was used for this study. A well-designed semi-structured pre-tested and modified questionnaire was used to collect the required data from the study subjects. Face-to-face interviews were conducted. Health conditions were determined from pre-diagnosed and medical records. Verbal or written consent was taken from respondents and hospital authority before starting the interview. After data collection, it was checked and cleaned thoroughly and competently to avoid possible mistakes. Data were categorized and coded using SPSS software. The specific value was included for each variable from primary data. Before final data collection pretesting or piloting was done to validate questions. The monthly income of the study population was collected on their response so there might be some discrepancy. Single hospital may not represent the community.

Results

Table 1: Association between income group and socio-demographic variables

Variables	Low income group	High income group	Total	Chi-square value	p-value
Age group	n	n			
20-50	159	197	356	9.879	0.002
51-80	143	105	248		
Total	302	302	604		
Family type	-	-	-	-	-
Joint	184	110	294	36.29	0.001
Nuclear	118	192	310		
Total	302	302	604		
Marital status	-	-	-	-	-
Married	302	268	570	36.08	0.001
Unmarried	0	34	34		
Total	302	302	604		
Educational Status	-	-	-	-	-
Below HSC	276	127	403	165.54	0.001
After HSC	26	175	201		
Total	302	302	604		
Occupation	-	-	-	-	-
Housewife	92	58	150	84.681	0.001
Business	52	39	91		
Service sector	67	173	240		
others	91	32	123		
Total	302	302	604		

Housing status	-	-	-	-	-
Own house	9	130	139	136.817	0.001
Rented house	293	172	465		
Total	302	302	604		

Table 1 shows that, there was an association between status (p-value=0.001), occupation (p-value=0.001), income group and age group (p-value =0.002), family type housing status (p-value=0.001). (p-value=0.001), marital status (p-value=0.001), educational

Table 2: Association between income group and physical activity

Variables	Low income group	High income group	Total	Chi-square value	p-value
Physical activity category	n	n			
Mild	26	140	166	152.99	0.001
Moderate	96	112	208		
Vigorous	180	50	230		
Total	302	302	604		
Regular physical exercise activity	-	-	-	-	-
Yes	114	26	140	72.0	0.001
No	188	276	464		
Total	302	302	604		
Lift using status	-	-	-	-	-
Yes	22	196	218	217.31	0.001
No	280	106	386		
Total	302	302	604		
BMI	-	-	-	-	-
Underweight	20	0	20	289.163	0.001
Normal weight	219	39	258		
Overweight	41	70	111		
Obesity	22	193	215		
Total	302	302	604		

Table 2 showsthat, there was an association between income group and physical activity (p-value=0.001), income group and regular physical exercise activity (p-value=0.001), income levels and lift using status (p-value=0.001), income levels and BMI (p-value=0.001).

Table 3: Association between income group and psychological state

Variable	Low income group	High income group		Chi-square value	p-value
Feeling feared	n	n			
Yes	105	138	243	7.49	0.006
No	197	164	361		
Total	302	302	604		
Forgetting tendency	-	-	-	-	-
Yes	106	194	300	51.28	0.001
No	196	108	304		
Total	302	302	604		

Table 3 shows that, there was an association between income group and feared feeling (p- value=0.006), forgetting tendency (p-value=0.001).

Table 4: Association between income group and behavior related variables

Variable	Low income group	High income group	Total	Chi-square value	p-value
Betel leaf	n	n			
Yes	174	109	283	28.09	0.001
No	128	193	321		
Total	302	302	604		
Drinking alcohol	-	-	-	-	-
Yes	29	92	121	41.02	0.001
No	273	210	483		
Total	302	302	604		

Table 4 shows that, there was an association between income levels and taking betel leaf (p- value=0.001), income levels and drinking alcohol (p-value=0.001).

Table 5: Association between income group and food and diet related variables

Variables	Low income group	High income group	Total	Chi square value	p-value
Do you take food from local hotel	n	n			
Yes	216	80	296	122.53	0.001
No	86	222	308		
Total	302	302	604		
Do you take food from restaurant	-	-	-	-	-
Yes	43	216	259	202.3	0.001
No	259	86	345		
Total	302	302	604		
Taking street food	-	-	-	-	-
Yes	248	63	312	226.99	0.001
No	54	239	292		
Total	302	302	604		
Taking fast food	-	-	-	-	-
Yes	40	215	255	207.85	0.001
No	262	87	349		
Total	302	302	604		
Extra salt during meal	-	-	-	-	-
Yes	158	131	289	4.83	0.028
No	144	171	315		
Total	302	302	604		
Taking carbonated drink	-	-	-	-	-
Yes	118	255	373	131.57	0.001
No	184	47	231		
Total	302	302	604		
Taking deep fried food at home	-	-	-	-	-
Yes	107	134	241		

No	195	168	363	5.033	0.025
Total	302	302	604		
Taking chukka rice or spoiled rice	-	-	-	-	-
Yes	185	44	229	139.33	0.001
No	117	258	375		
Total	302	302	604		
Do you like fruits	-	-	-	-	-
Yes	111	181	292	32.486	0.001
No	191	121	312		
Total	302	302	604		
Do you like vegetables	-	-	-	-	-
Yes	276	210	486	45.84	0.001
No	26	92	118		
Total	302	302	604		
Do you eat mashed potato	-	-	-	-	-
Yes	211	178	389	7.86	0.005
No	91	124	215		
Total	302	302	604		
Have you ever consulted a dietician	-	-	-	-	-
Yes	34	229	263	256.09	0.001
No	268	73	341		
Total	302	302	604		
Special or traditional diet	-	-	-	-	-
Yes	21	175	196	179.13	0.001
No	281	127	408		
Total	302	302	604		

Table 5 shows that, there was an association between income group and taking food from local hotel (p-value=0.002), taking food from restaurant (p-value=0.001), taking street food (p-value=0.001), taking fast food (p-value=0.001), taking extra salt during meal (p-value=0.028), taking carbonated drink (p-value=0.001), taking deep fried food at

home (p-value=0.025), taking chukka rice (p-value=0.001), taking fruits (p-value=0.001), taking vegetables (p-value=0.001), taking mashed potato (p-value=0.005), consulting dietician (p-value=0.001), special or traditional dieting (p-value=0.001), types of cooking oil (p-value=0.004).

Table 6: Association between income group and total calorie intake

Variables	Low income group	High income group	Total	Chi square value	p-value
Total calorie intake	n	n			
<2000	250	14	264	131.57	0.001
2000-2500	39	73	112		
>2500	13	215	228		
Total	302	302	604		

Table 6 shows that, there was an association between income group and total calorie intake (p-value=0.001).

Discussion

Diabetes is an emerging public health problem in Bangladesh. A systematic review and meta-analysis reported that the combined prevalence of pre-diabetes in Bangladesh is 10.1%

(Akhtar et al., 2020). Diabetes is a significant health concern with the potential to become a global epidemic, leading to serious complications, reduced life expectancy, and high healthcare costs. Non-communicable diseases including diabetes, are a major challenge to global public health and pose a significant obstacle to achieving the Sustainable Development Goal of reducing premature deaths from NCDs

by one-third by 2030. Uncontrolled diabetes can cause various serious and potentially life-threatening complications, including cardiovascular disease, diabetic neuropathy, kidney disease, eye disease, foot problems, and gum disease. Despite public health measures in developed regions such as Western Europe, the prevalence of type 2 diabetes remains high, indicating that its incidence is continuously increasing and remains a major cause of human suffering and death. A study in Dhaka reported that 58% of participants were overweight or obese based on central obesity and 63% based on BMI, with prevalence particularly high among women (82%) and men (77%) (Islam, 2010). In the current study, the average BMI was 21.92 ± 3.71 kg/m² in the low-income group and 27.78 ± 3.01 kg/m² in the high-income group. Among the total study population, 44.2% of participants had normal BMI, 37.3% were obese, 15.8% were overweight, and 2.7% were underweight. Normal BMI was most common in the low-income group (39.6%), whereas obesity predominated in the high-income group (33.5%). Underweight was observed only among low-income participants. These findings align with the study conducted by Islam et al. (2010). The current study found that the multivariable logistic regression model demonstrated that age, education, and BMI were independently and significantly associated with income group. Participants with higher educational attainment had about 22 times higher odds of being in the high-income group compared with those with lower education. This finding highlights education as the strongest independent predictor of high-income status in the model. Participants in the higher age category had approximately four times higher odds of belonging to the high-income group compared to younger participants. Each one-unit increase in BMI was associated with a 48.5% increase in the odds of belonging to the high-income group, suggesting that higher BMI levels were more common among high-income participants. Higher educational attainment and older age substantially increased the likelihood of belonging to the high-income group, while higher BMI was also more prevalent among high-income participants. The findings of this study reflect a common socioeconomic pattern in developing nations, often described as the “obesity–income paradox in transition.” Higher education enhances earning potential, older age reflects accumulated economic advantage, and higher income facilitates lifestyle patterns that may predispose individuals to increased BMI. These results are consistent with both economic theory and contemporary epidemiological evidence from transitional settings. Rahman et al. (2024) reported that in several lower-middle-income countries, higher economic status is associated with increased prevalence of overweight and obesity due to greater access to calorie-dense foods, reduced physical activity, and lifestyle changes. Similarly, recent population-based analyses indicate that rising income in transitional economies leads to higher consumption of processed and energy-dense foods, contributing to increase BMI (Zhang & Wang, 2025). The current study found that 28.5% of respondents were smoking, with the prevalence of smoking was significantly

higher among the high-income group (22.7%) compared to the low-income group (5.8%). Similarly, smoking was found to be positively associated with high income, suggesting that affluent individuals may adopt certain lifestyle behaviors despite awareness of associated health risks a finding that aligns with Ng et al (2014), who observed increasing tobacco use among higher-income urban males in developing countries. Fast food and carbonated drink consumption were negatively associated with high income in this study, which contrasts with findings by Zhang et al (2021), where high-income individuals reported greater fast-food intake due to urbanized work patterns and convenience culture. However, the strong positive association between BMI and income supports the argument that obesity and overweight are more common among affluent individuals, as demonstrated by Popkin et al (2020), who described the “nutrition transition” in developing nations where higher income leads to increased calorie intake and reduced physical activity. The current study found that the average random blood sugar level was 2.33 ± 0.64 in the low-income group and 2.58 ± 0.61 in the high-income group. Among the total study population, 52.3% of respondents had diabetic, 40.8% had pre-diabetic, and 6.9% had normal random blood sugar levels. Diabetes was more prevalent in the high-income group (30.8%) than in the low-income group (21.5%), whereas pre-diabetes was more common among low-income participants (26.5%). This finding is supported by research conducted by Sarkar et al (2021). The current study found that 45.0% of respondent’s mother had diabetes which was more frequent in the high-income group (26.9%) than the low-income group (18.1%). Similarly, 39.2% of respondent’s father had diabetes with a higher proportion in the high-income group (24.6%) than in the low-income group (14.6%). Despite a history of type 2 diabetes in siblings, 33.5% of respondents had siblings with diabetes, which was relatively equal between low and high income groups. These findings are supported by research conducted by Lysenko et al. (2015). Previous studies have shown that the suicide rate among people with type 2 diabetes in Mexico was 11.6%, higher than the general population rate of 5.2%, indicating an elevated risk of suicidal tendencies among diabetic patients. Although major psychological disorders are more common in people with diabetes than in the general population, increased levels of hostility and emotional distress can contribute to suicide (Abdelmagid et al., 2022). In the current study, 28.5% of high-income respondents and 30.8% of low-income respondents reported suicidal tendencies. This finding was not consistent with the results reported by Abdelmagid et al. (2022). The findings of this study reveal significant socio-economic disparities in the distribution of type 2 diabetes risk factors between high- and low-income populations in Dhaka city. Clear differences were observed in socio-demographic characteristics, lifestyle behaviors, health awareness, and metabolic outcomes across income groups. Education, age, and BMI were identified as strong independent predictors of income status, with higher education emerging as the most influential determinant. High-income participants were generally more educated,

formally employed, and more likely to live in nuclear families. They exhibited higher BMI levels, greater obesity prevalence, and a higher proportion of diagnosed diabetes. Despite better access to healthcare services and higher awareness, unhealthy lifestyle patterns-such as sedentary behavior, increased caloric intake, smoking, and psychological stress appeared to contribute to their elevated metabolic risk. Conversely, low-income participants commonly had lower educational attainment, lived in joint families, and were engaged in labor-intensive occupations. Although they performed more vigorous physical activity due to occupational demands, they experienced substantial barriers including limited healthcare access, inadequate screening, poor dietary quality, misconceptions about diabetes, and reduced preventive practices. Pre-diabetes was more prevalent in this group, suggesting a rising future disease burden. Overall, the discussion indicates that diabetes risk in urban developing settings follows a transitional pattern. Economic advancement is associated with obesity and lifestyle-related risks, while economic deprivation is linked to structural and informational barriers that also increase vulnerability. These findings underscore the importance of addressing socio-economic inequalities and designing targeted, income-sensitive interventions to effectively prevent and control type 2 diabetes.

Conclusion

Type 2 diabetes mellitus has emerged as one of the most pressing non-communicable diseases globally, with its burden rising rapidly in low-and middle-income countries undergoing demographic and socioeconomic transitions. Bangladesh, particularly its densely populated urban centers such as Dhaka city, is experiencing a marked increase in diabetes prevalence driven by rapid urbanization, lifestyle transformation, and widening socioeconomic disparities. The increasing prevalence of type 2 diabetes in urban Bangladesh presents a significant public health challenge, particularly in the context of rapid socioeconomic and lifestyle transitions. This study synthesizes the study's findings, highlighting how income and related socioeconomic factors shape diabetes risk, health behaviors, and disease management patterns. By integrating model-based evidence from the study, the conclusions focus on key determinants such as education, BMI, dietary habits, and lifestyle behaviors, emphasizing the nuanced and context-dependent nature of diabetes risk. Following the conclusions, practical recommendations are proposed to inform income-sensitive public health

strategies, targeted interventions, and policy initiatives aimed at reducing diabetes-related morbidity and improving population health outcomes.

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