International Journal of Research Studies in Biosciences (IJRSB)
Volume 10, Issue 1, 2024, PP 15-22
ISSN (Online) 2349-0365
https://doi.org/10.20431/2349-0365.1001003
www.arcjournals.org

Socioeconomic Factors Responsible for Prevalence of Kidney Disease in Obese-Diabetic Adults

Amina A. Belal[1*], K.C. Bhuiyan[2]

[1]*Ph.D student at the School of Mathematical Sciences, Faculty of Science & Technology, Universiti Kebangsaan Malaysia*

[2]*Professor (Retired) of Statistics, Jahangirnagar University, Dhaka, Bangladesh*

Corresponding Author:** ***Amina A. Belal, *Ph.D student at the School of Mathematical Sciences, Faculty of Science & Technology, Universiti Kebangsaan Malaysia.*

Abstract

Background: *Kidney disease significantly impacts global health, not only as a direct cause of morbidity and mortality worldwide but also as a major risk factor for cardiovascular disease.*

Methods: *The information presented in this paper was based on data collected from 995 adults of 18 years and above of both rural and urban areas of Bangladesh. These adults were interviewed by some nurses and medical assistants working in some diagnostic centres located in urban and semi-urban areas. The respondents were visiting the centres for their blood and urine screening test.*

Results: *Out of 995 respondents, there were 53.4% rural people, 50.1%males, 30.2% obese adults, 67.0% diabetic patients, 9.2% kidney patients, 22.0% obese-diabetic adults and 5.0% kidney patients along with obesity and diabetes. The objective of the analysis was to observe the risk of socioeconomic factors for the prevalence of kidney disease in obese-diabetic adults and to identify the influential socioeconomic variables for the prevalence.*

Conclusion: *It was observed that the highest risk of prevalence was noted for the variable longer duration of diabetes followed by old age, and hypertensive blood pressure. Risk of prevalence was also more for smokers and sedentary activists. The most influential variables for prevalence of the diseases under consideration were duration of diabetes, age, and body mass index. This phenomenon was noted from the results of fitted logistic regression model.*

Keywords: *Prevalence of obesity-diabetes- Kidney disease, Influential variables for prevalence of these 3 diseases, Risk ratio, Logistic regression model.*

1. INTRODUCTION

Obesity of human being is nothing but excessive fat accumulation in body due to uncontrolled food habit of taking process food containing more sugar, salt, and fatty acid. Consequently, people face the problem of many non-communicable diseases, especially, diabetes, hypertension, cardiovascular diseases, kidney diseases, etc. [1 – 8]. The problem of obesity and its associated diseases is accumulating in many countries due to upward mobility in economy and social status and the problem is shifting towards lower socioeconomic group of people [9- 14]. Some of the problems induced by obesity were reported in different studies in Bangladesh. These are simultaneous prevalence of obesity-diabetes, obesity-heart disease, obesity-kidney diseases, obesity-retinopathy, obesity-hypertension, obesity- disability [9 – 14]. The patients of these diseases are increasing day by day as number of obese people are increasing throughout the world. It was reported by World Health Organization that around 650 million people worldwide were obese, and 1.9 billion adults were overweight [15, 16]. Obesity also enhances diabetes and other non-communicable diseases. Currently, number of diabetic patients of ages 20 – 79 years are around 579 million in the world. This number is predicted to increase to 643 million by 2030 and 783 million by 2045 [17]. A study in Bangladesh showed that there were13.5% obese-diabetic adults [9]. Again, diabetes is a risk factor for kidney diseases. Current number of reported chronic kidney patients in the world is more than 800 million and the disease is more prevalent in diabetic patients [18]. In one study in Bangladesh, it was found

that there were 4.7% diabetic-kidney patients [19] and 6.2% obesity-kidney patients among adults [12]. For Bangladeshi adults, the responsible variables for the prevalence of obesity-diabetes, obesity-kidney disease and diabetic-kidney diseases were old age, being married, lower -level education, higher income, involvement in sedentary activities, physical inactivity, and longer duration of diabetes [9, 12, 19]. In this paper an attempt was made to identify some influential variables for the prevalence of kidney disease among obese-diabetic adults.

2. METHODOLOGY

The present analysis was done using the data collected from 995 adults of ages 18 years and above. The data were collected by some nurses and medical assistants working in some diagnostic centres located in both urban and semi-urban areas in Bangladesh. The adults were interviewed during the session 2018 – 19 when they were visiting the diagnostic centres for blood and urine screening test.

It was decided to collect the data from 50.1% males and 49.9% females to maintain the sex ratio of the country which was 50.1:49.9 during the study period [20]. Thus, we had 498 males and 497 females in the sample. The collected data were related to different socio-demographic characteristics along with information on sufferings from different diseases and treatment stages of those diseases. All information were recoded from all investigated adults through a pre-designed and pre-tested questionnaire. This information was on residence, religion, marital status, age, education, occupation, family income, family expenditure, smoking habit, sedentary activity, physical work, food habit, blood pressure, fasting blood sugar, duration of diabetes, duration of sufferings from other diseases, the stage of treatment by the registered medical practitioner/rural medical assistants. Some of the information were qualitative in nature and some were quantitative in character. For ease of analysis, all the variables were noted in nominal scale. The economic condition of any of the family was decided as lower (if monthly income of a family was < Tk.50 thousand and expenditure was < Tk. 40 thousand), medium (if income was Tk. 50 - 100 thousand and expenditure was between Tk.40 - < 80 thousand), (if income was 50 – 100 thousand taka and expenditure was between Tk. 80 - < 100 thousand taka) and higher (if income was Tk. 150 and above and expenditure was Tk.120 thousand and above). To identify the obese adults the body mass index, (BMI weight in kg divided by height in meter^2) was measured and any respondent was considered as underweight (if BMI < 18.5), normal (if 18.5 < BMI < 23.0), overweight (if 23.0 < BMI < 27.5) and obese (if BMI $\geq$ 27.5) [21, 22]. The investigated adults were classified into 4 groups according to level of blood pressure (BP, mmHg) of them. The first group was of optimal blood pressure (BP< 120/80), the second group was of normal blood pressure (BP < 130/85), the third group was of high normal blood pressure (BP< 140/90), and the fourth group was of hypertensive blood pressure (BP $\geq$ $140/90$ [23, 24].

The study variable was prevalence of kidney diseases among obese- diabetic adults; the sample adults possessing this characteristic were 50 (5.0%). The influence of socioeconomic variables on prevalence of the diseases under consideration were studied by fitting logistic regression model [25 – 28]. From the results of the fitted model, one would be able to identify the influential variable(s) for the prevalence of the diseases. Significant coefficient of a variable indicated that the variable was influential in enhancing the prevalence rate of the diseases. According to the objective of the study, association of the study variable with other socio-demographic variables were investigated. Irrespective of significance of the association, the responsible level of a variable for the prevalence of the study variable in higher rate was identified by calculating risk ratio [29, 30].

3. RESULTS

Total investigated adults were 995. Five percent of them were suffering simultaneously from kidney disease, obesity, and diabetes. There were 53.4% adults from rural areas; among them 5.5% were patients of all these 3 diseases. The corresponding percentage among urban adults was 4.5. But these two rates were not significantly different [χ^2=0.454, *p*-value=0.500], though rural people had 21.0% more risk of prevalence of the diseases concerned. There were only 14.8% non-Muslim adults in the sample; the prevalence rate in them was 8.2%. This rate was significantly higher at 5.9% level of significance and non-Muslim adults were at higher risk of prevalence by 82% [χ^2=3.559, *p*-value=0.059; R.R.=1.82, C.I. (0.97, 3.10)]. The percentage of males in the sample was 50.1; among them 6.4% were suffering from kidney-obesity-diabetes. This rate was significantly higher than the rate prevailed in females (3.6%) and males had 77.0% more risk of prevalence [χ^2=4.098, *p*-value=0.043; R.R.=1.77, C.I. (1.01, 3.11)]. The percentage of married adults was 93.1; prevalence rate

in them was 5.1%. This rate was slightly more compared to the prevailed rate in single adults (4.3%). The rates prevailed in males and females were statistically similar and males had higher risk of prevalence only by 17.0% [χ^2=0.071, *p*-value=0.790; R.R. =1.17, C.I. (0.37, 3.66)]. The percentage of elderly people of ages 50 years and above was 19.6 in the sample. Among them 14.9% were suffering simultaneously from obesity-diabetes-kidney disease. This percentage was significantly higher than the percentages of prevalence among adults of other age groups [χ^2=65.087, *p*-value=0.000]. The elderly patient's group had 5.67 times of risk of prevalence [R.R. =5.67, C.I. (3.31, 9.72)]. Only 6.5% adults were illiterate and prevalence rate in them was 7.7% which was higher than the prevalence rates in adults of other levels of education. These illiterate people had 59% more risk of prevalence than the risk of other adults [R.R. =1.59, C.I. (0.65, 3.87)]. The lowest prevalence rate was noted in primary educated adults (2.5%). But the rates of prevalence among adults of different levels of education were not significantly different [χ^2= 5.590, *p*-value=0.133].

There were 30.7% servicepersons and 12.3% retired persons. The prevalence rates in these two groups were 5.6% and 5.7%, respectively. The prevalence rate among these two groups together was 5.6%. The risk of prevalence for both the groups together was 1.23 times compared to the risk of adults of other levels of occupation [R.R. =1.23, C.I. (0.72, 2.11)]. However, the rates prevailed in adults of different levels of occupation were not significantly different [χ^2=0.638, *p*-value= 0.708]. Insignificant differential rates were noted among adults belonged to different levels of economic conditions [χ^2=1.390, *p*-value=0.708]. However, highest rate (8.2%) was observed in adults of upper medium economic condition. They were only 6.1% in the sample and for them the risk of prevalence was 70% more compared to the risk prevailed in adults of other economic conditions [R.R. =1.70, C.I. (0.70, 4.13)].

Table 1. *Distribution of Adults according to prevalence of kidney disease along with obesityand diabetes*

Variables	Prevalence of kidney disease in obese – diabetic adults.				Total	
	Yes		No			
	Number	%	Number	%	Number	%
Residence						
Rural	29	5.5	502	94.5	531	53.4
Urban	21	4.5	443	95.5	464	46.6
Total	50	5.0	945	95.0	995	100.0
Gender						
Male	32	6.4	466	93.6	498	50.1
Female	18	3.6	479	96.4	497	49.9
Religion						
Muslim	38	4.5	810	95.5	848	85.2
Non-Muslim	12	8.2	135	91.8	147	14.8
Marital status						
Married	47	5.1	879	94.9	926	93.1
Single	3	4.3	66	95.7	69	6.9
Age (in years)						
< 25	1	0.5	195	99.5	196	19.7
25 – 40	4	1.0	397	99.0	401	40.3
40 – 50	16	7.9	187	92.1	203	20.4
50+	29	14.9	166	85.1	195	19.6
Education						
Illiterate	5	7.7	60	92.3	65	6.5
Primary	9	7.4	112	92.6	121	12.2
Secondary	6	2.5	231	97.5	237	23.8
Higher	30	5.2	542	94.8	572	57.5
Occupation						
Farming	5	4.8	99	95.2	104	10.5
Business	10	4.3	224	95.7	234	23.5
Service	17	5.6	288	94.4	305	30.7
Retire	7	5.7	115	94.3	122	12.3
Housewife	11	4.8	219	95.2	230	23.1
Economic condition						
Low	19	4.9	366	95.1	385	38.7

Medium	20	4.7	404	95.3	424	42.6
Upper medium	5	8.2	56	91.8	61	6.1
High	6	4.8	119	95.2	125	12.6
Smoking habit						
Yes	25	7.6	304	92.4	329	33.1
No	25	3.8	641	96.2	666	66.9
Involvement in sedentary activity						
Yes	29	6.6	413	93.4	442	44.4
No	21	3.8	532	96.2	553	55.6
Doing physical work						
Yes	24	5.0	457	95.0	481	48.3
No	26	5.1	488	94.9	514	51.7
Habit of taking process food						
Yes	23	6.3	340	93.7	363	36.5
No	27	4.3	605	95.7	632	63.5
Body mass index						
Underweight	0	0.0	38	100.0	38	3.8
Normal	0	0.0	233	100.0	233	23.4
Overweight	0	0.0	424	100.0	424	42.6
Obese	50	16.3	250	83.7	300	30.2
Blood pressure (mmHg)						
Optimum	8	1.5	532	98.5	540	54.3
Normal	18	6.4	262	93.6	280	28.1
High normal	15	12.9	101	87.1	116	11.7
Hypertensive	9	15.3	50	84.7	59	5.9
Duration of diabetes (in years)						
Does not arise	0	0.0	328	100.0	328	33.0
< 5	6	2.1	285	97.9	291	29.2
5 – 10	12	5.8	194	94.2	206	20.7
10 – 15	13	13.1	86	86.9	99	9.9
15+	19	38.0	52	62.0	71	7.1
Total	50	5.0	945	95.0	995	100.0

The sample smoker adults were 33.1%; the prevalence rate in these adults was 7.6% against the non-smoker patients of obesity-diabetes-kidney disease of 3.8%. The prevalence rate in smokers was significantly higher than the rate prevailed in non-smokers [χ^2=6.822, *p*-value=0.009]. Smokers had around two times risk of prevalence compared to the risk of non-smokers [R.R. =2.02, C.I. (1.18, 3.47)]. There were 44.4% adults who were involved in sedentary activities and amongthem6.6% were patients of the 3 non-communicable diseases which were under consideration. This rate was significantly higher than the rate (3.8%) prevailed in adults not involved in sedentary activities [χ^2=3.931, *p*-value= 0.047]. Sedentary activity made a higher risk of prevalence by 73% [R.R. =1.73, C.I. (1.00, 2.99]. Process food consumption made a more risk of prevalence by an amount48.0%. The prevalence rate in process food consumers was 6.3% creating a higher risk of prevalence by 48.0% [R.R. =1.48, C.I. (0.86, 2.54)]. The sample consumers were 36.5%. The prevalence rate in non-consumers of process food was 4.3%. These two prevalence rates were statistically similar [χ^2= 2.056, *p*-value=0.151]. There were 51.7% physically inactive adults in the sample. The prevalence rate in them was 5.1% as against the rate 5.0%in physically active adults who were 48.3% in the sample. These two prevalence rates were statistically similar [χ^2= 0.002, *p*-value=0.960] and the risks of these two groups of adults were also similar [R.R. =1.01, C.I. (0.59, 1.73)].

There were 30.2% obese adults and 16.3% of them were patients of obesity-diabetes-kidney disease. The proportions of patients and non-patients in obese adults was significantly different [z = 10.7, *p*-value=0.000]. In the sample there were 5.9% hypertensive adults; the prevalence rate in them was 15.3%. This rate was significantly different from the rates prevailed in adults of other levels of blood pressure [χ^2=43.491, *p*-value= 0.000]. The hypertensive adults had 248% more risk of prevalence than the risk of other adults [R.R. = 3.48, C.I. (1.78, 6.82)]. There were 67.0% diabetic adults; they

were suffering for different time periods. The percentage of diabetic adults who were suffering for 15 years and above was only 7.1and the prevalence rate in them was 38.0% which was significantly higher than the prevalence rates in diabetic patients suffered for shorter periods of time [χ^2= 106.897, *p*-value=0in.000].This group of patients had risk of 7.98 times compared to the risk of patients suffered for shorter periods of time [R.R. = 7.98, C.I. (4.76, 13.39)].

3.1. Results of Logistic Regression Analysis

It was noted that there are two groups of adults; in one group there were 50 patients of obesity-diabetes-kidney disease. The remaining 945 adults were not suffering simultaneously from these 3 non-communicable diseases. One of the objectives of the study was to identify the influential variables for the prevalence of the diseases in 50 patients. The prevalence of obesity-diabetes-kidney was considered as dependent variable in fitting the binary regression model; the independent variables were residence, religion, gender, marital status, age, education, occupation, economic condition, smoking habit, habit of doing physical work, sedentary activity, habit of taking process food, body mass index, blood pressure, and duration of diabetes. The analysis was satisfactory as it showed -2log likelihood = 213.565, Nagelkerke R^2=0.511. The analysis showed that the impact of each of the variable's age, body mass index, and duration of diabetes was highly significant. The values of Exp(B) against these 3 variables indicated that increase in the values of these variables significantly increased the risk of prevalence of the diseases under consideration. This phenomenon was also noted, though not significant, for any of the variable's religion, education, occupation, habit of taking process food, and habit of doing physical work. The analysis also provided the information that the chance of prevalence for a married higher educated Muslim retired obese adult of urban area aged 65 years and belonged to family of higher economy was 0.988. For such adult it was considered that the person was habituated in process food, smoking, and sedentary activity. Such person was suffering from diabetes for 15 years and he/she was physically inactive. If the age of the person is 40 years and he/she has been suffering from diabetes for 10 years, the chance of prevalence become 0.979. When the age become 40 years and suffering from diabetes for 10 years. The results were presented in Table 2.

Table 2. *Results of fitted Logistic regression model*

Variable	Coefficient, B	S. E	Wald- Statistic	Exp(B)	*p*-value
Duration of diabetes	0.324	0.163	3.941	1.382	0.047
Body mass index	4.568	1.028	19.746	96.371	0.000
Age	1.242	0.316	15.434	3.462	0.000
Blood pressure	-0.218	0.225	0.939	0.332	0. 804
Smoking habit	-0.142	0.419	0.115	0.867	0.009
Gender	-0.156	-0.064	0.996	4.107	0.043
Sedentary activity	0.153	-0.014	0.996	3.939	0.047
Religion	0.146	0.129	0.996	3.565	0.059
Habit of taking process food	0.111	0.055	0.998	2.058	0.152
Education	-0.062	-0.139	0.999	0.648	0.421
Residence	-0.052	-0.032	1.000	0.453	0.501
Marital status	-0.021	-0.015	1.000	0.071	0.790
Economic condition	0.020	-0.065	1.000	0.066	0.798
Occupation	0.017	0.025	1.000	0.048	0.826
Habit of doing physical work	-0.004	-0.047	1.000	0.002	0.960

4. DISCUSSION

The results presented here were derived in analysing data collected from 995 adults of 18 years and above of both rural and urban areas. Data were collected by some nurses and medical assistants working in diagnostic centres located in urban and semi-urban areas. The investigated adults were visiting the centres for their blood and urine screening test. Among the adults 30.2% were obese, 67.0% were diabetic patients, kidney patients were 9.2%, 22.0% were obese-diabetic patients, 6.2% were obesity-kidney patients, 7.7% were diabetic- kidney patients, and 5.0% were patients of obesity-diabetes – kidney disease. The last group was termed as patient's group. The main objective of the study was to identify the influential socioeconomic characteristics for the prevalence of these three diseases in 50 patients and to study the level of a variable which was risky for the prevalence as the disease was noted more prevalent in elderly people, in women, in diabetic patients [18].

The variables considered in the way of analysis were residence, religion, gender, marital status, age, education, occupation, economic condition, smoking habit, habit of taking process food, habit of doing physical work, sedentary activity, blood pressure, body mass index, and duration of diabetes. The prevalence rates of the diseases in rural people, in non-Muslim adults, and in married adults were higher, not significantly, than the prevalence rate in all adults (5.0%). Significantly higher (8.2%) rate prevailed in non-Muslim adults than the rate in Muslim adults. Very high prevalence rate (14.9%) prevailed in elderly adults of 50 years and above. For this group of patients, the risk of prevalence was 567.0%. Higher rates of prevalence were noted separately in Illiterate people, in retired persons, and in adults of families of upper medium economy, though the rates of different classes in each category were not significantly different. The prevalence rates among smokers (7.6%) and among adults involved in sedentary activities (6.6) were significantly higher in comparison to the rate prevailed in all adults together (5.0%). The prevalence rate in physically inactive adults was (5.1). This rate was 5.0 in physically active adults. It meant physical activity was not the responsible factor for prevalence. Similar was the case for process food consumers.

There were 30.2% obese adults in the sample; the kidney disease and diabetes were noted in 16.3% of them. Simultaneous prevalence of diabetes and kidney disease were not noted in non-obese adults. It indicated that simultaneous prevalence of diabetes and kidney disease were induced by obesity. It was also noted that age, body mass index and duration of diabetes were the influential variables for prevalence of the diseases. The rate of prevalence became high when the level of each of these 3 variables were increased by one unit.

5. CONCLUSION

The risk of diabetes increases linearly with the increase in level of body mass index and obesity is a state of higher body mass index when it becomes 27.5 and above. Again, obese, and diabetic people are exposed to many other non-communicable diseases [31, 32, 33]. One of the complications of diabetes is kidney disease and one third diabetic patients are affected by kidney diseases. Prevalence of chronic kidney disease (CKD) is in increasing trend with alarming rate of increase. Death due to CKD is increased by 41.5% from 1990 to 2020 and by 2040 the death due to CKD will be the fifth leading cause of death worldwide. The incidence of death will occur mostly in low and middle countries [18].

The analysis presented here was based on data collected from 995 Bangladeshi adults. Five percent of these adults were suffering simultaneously from obesity-diabetes-kidney disease. The corresponding percentage was 5.5 among rural adults, 6.4 in males, 8.2 among non-Muslims, 14.9 among elderly people, 7.7 among illiterate people, 5.7 among retired persons, 8.2 among adults of upper medium economic condition, 7.6 in smokers, 6.6 in adults involved in sedentary activities, 15.3 in hypertensive adults, and 38.0 in diabetic patients who were suffering for 15 years and above. These percentages were higher than the prevalence rate in all sample adults. But prevalence rates in males, in elderly people, in smokers, in adults involved in sedentary activities, in hypertensive adults, and in diabetic patients suffered for longer period were significantly different. The risks of prevalence for the above-mentioned adults were higher compared to the risks prevailed in their counter parts. Highest risk was noted among diabetic patients suffered for 15 years and above followed by risk of elderly people, risk of hypertensive. Obesity is associated with the development of kidney disease directly as well as via diabetes, and hypertension.

These three interrelated non-communicable diseases are also known as lifestyle disease as rate of overweight and obese persons is in increasing trend due to upward movement of socioeconomic characteristics of people. Thus, the prevalence of higher level of body mass index cannot be avoided, but it should be reduced to reduce the prevalence rate of diabetes and hypertension. For this, people should follow the following steps:

1. Everybody should try to take home-made healthy food and try to avoid the salty and sugar- based process food.
2. Everybody should do some sort of physical work or at least walk regularly for certain period.
3. Everyone should avoid smoking.
4. If possible, people should check and control blood sugar.

Government can prepare some policies related to healthy life of people. The policies can be implemented through different agencies working in the health sectors

REFERENCES

[1] WHO (2020): Obesity and overweight, who.int/news-room/fact-sheets/detail/obesity and overweight.

[2] Bhuyan, K.C. and Fardus, J.(2019): Level of obesity and socioeconomic factors of a group of adult people of Bangladesh: A factor analysis approach, Smer Jour Data Mining and Knowledge Discovery, 4(1), 8 – 14,doi: 10.11648/j.ajdmkd.20190401.12.

[3] Bhuyan, K.C. and Fardus, J. (2019): Discriminating Bangladesh adults by level of obesity, LOJ Med Sci, 3(1), 210 – 217.

[4] Bhuyan, K.C.; Mortuza, A. and Fardus, J. (2018): Discriminating patients suffering from non-communicable diseases: A case studymong Bangladeshi adult, Biomed Jour Sci& Tech, DOI:10.26717/BJSTR.2018.10.001898.

[5] Mokdad, A.H.; Ford, E.S.; Bowman, B.A. et al (2003): Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001, JAMA, 289(1), 76 – 79.

[6] Barnes,S.A. (2011): The epidemic of obesity and diabetes: Trends and treatments, Tex Heart Inst Jour, 38(2), 142 – 144.

[7] Biswas, T.; Garnett, S.P.; Parvin, S. et al (2017): The prevalence of underweight, overweight and obesity in Bangladeshi adults: Data from a national survey, PLoS One 12(5), e0177395.

[8] Misra, A. Khurana, L. (2008): Obesity and the metabolic syndrome in developing countries, Jour ClinEndocrinolMetab, 93(1), suppl1. 51 – 58

[9] Bhuyan, K.C.(2020): Discriminating Bangladeshi adults by simultaneous prevalence of obesity diabetes, Series of Endo Dia and Metab, 2(2), 19 – 25.

[10] Bhuyan, K.C. (2020): Identification of responsible variables for obesity hypertension among Bangladeshi adults, Arch Dia and Endo System, 3(1), 27 – 34.

[11] Bhuyan, K.C. (2020): Factors responsible for obesity heart diseases among Bangladeshi adults, Jour Heart and Cardiovascular Sci,doi: 10.47755 j. Heart CardiovacSci 2020.1.002.

[12] Bhuyan, K.C. (2020): Identification of socioeconomic variables responsible for obesity kidney diseases among Bangladeshi adults, Jour Diaband Islet Biology, 3(2), DOI: 10.31579/2641-8975/0024.

[13] Bhuyan, K.C. (2020): Identification of risk factors for obesity retinopathy among Bangladeshi adults, Curr Res in Dia&Obesity Jour, 13(5), DOI: 10.19080/CRDOJ 2020, 13.555872.

[14] Bhuyan, K.C. (2020): Discriminating Bangladeshi adults by the prevalence of obesity disability, Jour Diab and Islet Biology, 3(1) -022.

[15] WHO (2020): Obesity and overweight, who.int/news-room/fact-sheets/detail/obesity-and-overweight.

[16] WHO (2024): World obesity day 2022 – Accelerating action to stop obesity, who.int/news/item/04-03-2022.

[17] International Diabetes Federation (2021): Diabetes Atlas, 10th edition.

[18] Csaba P.Kovesdy (2022): Epidemiology of chronic disease: an update 2022, Kidney International Supplements, 12(1), 1 – 11.

[19] Bhuyan, K.C. (20200: Identification of socioeconomic variables responsible for diabetic kidney disease among Bangladeshi adults, Biomed Jour Sci& Tech Res, MS ID 004021, 18092-98.

[20] Bangladesh Bureau of Statistics (2018): Statistical Yearbook of Bangladesh, 2017, BBS, Dhaka.

[21] Biswas, T.; Garnett, P.; Sarah and Rawal; B. Lal (2017): The prevalence of underweight, overweight, and obesity in Bangladesh: Data from a national survey, PLoS One, 12(5), e0177395.

[22] WHO (2004): Appropriate body mass index for Asian population and its implications for policy and intervention strategies, Expert Consultation, Public Health, Lancet 363.

[23] Jessica, Y, I.; Zaman, M.M.; Haq, S.A.; Ahmed, S. and Al-Quadir, Z. (2018): Epidemiology of hypertension among Bangladeshi adults using the 2017 ACC/AHA Hypertension Clinical Guidelines and Joint National Committee 7 Guidelines, Jour Hypertension, 32, 668 – 680.

[24] Jan, A.S.; Yan, Li; Abusah; Kei, A.; Eamon, D. and O'Brien, E. (2017): Blood pressure measurement anno 2016, Amer Jour Hypertension, 30(5), 453 – 463.

[25] Hosmer, D.W.; Lemeshow, S. and Sturdivant (2013): Applied Logistic Regression, Books, Google. Com,

[26] Gasso (2019): Logistic Regression

[27] Lavally, M.P. (2008): Logistic Regression, American Heart Association

[28] Nick, T.G. (2007): Logistic Regression: Topics in Biostatistics, Springer.

[29] Bhuyan, K.C. (2020): Introduction to Meta Analysis, Lap Lambert Academic Publishing.

[30] Bhuyan, K.C. (2022): Risk Factors for Simultaneous prevalence of two Non-communicable Diseases in Bangladeshi Males and Females, Lambert Academic Publishing.

[31] Leitner, D.R.; Gema, F.;Volkan, Y.; Karin,S.; Dragan, M.; Euan, W. and Hermann, T. (2017): Obesity and type-2 diabetes: Two diseases with aneed for combined treatment strategies EASO can lead the way, Obe Facts,10(5), 483 – 492 , doi: 1159/000480525.

[32] Grams,J. and Garvy, W.T. (2015): Weight loss and the prevention and treatment of Type-2 diabetes using lifestyle therapy, pharmacotherapy, and bariatric surgery: Mechanisms of action, CurrObesRep, 4(2), 287 – 302; doi: 10.1007/s 13679 – 015 – 0155 – x.

[33] Bahrey, D.; Gebremedhn, G.; Mariye, T.; Girmay, A.; Aberhe, W.; Hika, A.; Teklay, G.; Tasew, H.; Zeru, T.; Gerensea, H.; and Teklemariam, G. (2019: Chronic kidney disease among adult hypertensive patients in Tigray Teaching Hospitals: a cross-sectional study, BMC Research Note, 12, 562; https://doi.org/10.1186/s13104-019-4610-8.

[34] Nayanjot K. Rai; Zheng Wang; Paul E. Drawz; John Connett and Daniel P. Murphy (2023): Chronic kidney disease progression, risk, and subsequent cause of death: A population based cohort study, Kidney Medicine, 5(4), 100604.

Citation: *Amina A. Belal, K.C. Bhuiyan. Socioeconomic Factors Responsible for Prevalence of Kidney Disease in Obese-Diabetic Adults. International Journal of Research Studies in Biosciences (IJRSB). 2024; 10(1):15-22. DOI: http://dx.doi.org/10.20431/2349-0365.1001003.*