

## Obesity in Adults: A Neglected Public Health Problem in Urban Areas of Kandahar City, Afghanistan

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**ABSTRACT: -Background:** Obesity is a major public health problem particularly, for elderly, considered one of the most serious challenges all over the world. This study aims to determine the prevalence and risk factors of obesity among elders Kandahar city, Afghanistan.

**Methods and Materials:** Descriptive and analytical cross sectional study was conducted in Kandahar city within October-November, 2015. Multistage random sampling technique used and 1165 adults of 25-70 years were cleaned for analysis. WHO STEPS approach used to collect data on demographic and behavioral factors. Physical measurement comprising height, weight and blood pressure including blood samples were collected and tested for biochemical measurements including blood lipids. Descriptive and inferential analyses were performed using SPSS v.20.

**Results:** The prevalence of underweight, normal weight, overweight, obesity grade I, obesity grade II and obesity grade III were 4.9%, 44.8%, 34.3%, 11.2%, 2.9% and 1.9% respectively. Out of all respondents 597 (51.2%) were females and 568 (48.8%) males with a mean age of 38.3±11.2 years. Around two thirds (73.2%) were illiterates and (79.3%) were married. 9.7% were smokers and (16.3%) were mouth snuff users. The average of total cholesterol, glycerides, high density lipoprotein, low density lipoprotein and fast blood sugar were 183 mg /DL, 154.65mg/DL, 45.85mg/DL, 107.3 mg/DL and 131mg/DL respectively. Age, sex, education status, walking, triglyceride level, high blood pressure and central obesity were independently associated with obesity.

**Conclusion:** Obesity is a cause of concern in urban citizens in Afghanistan. Increase awareness about obesity and healthy lifestyle is essential for adults to prevent obesity and its complications.

**Key Words:** Prevalence, Obesity, adults, risk factors, WHO Steps, Afghanistan

### I. INTRODUCTION

Obesity is a complex condition contributing to chronic diseases by affecting virtually all ages and socioeconomic groups [1]. Obesity is said to be adversely affecting the structure and functions of the body and lowering overall quality of life [2]. Discrimination with respect to employment, education, healthcare and compensation to work are other social problems that obese and overweight adults will suffer from [3-4]. In 2010, overweight and obesity were estimated to cause 3.4 million deaths, 4% of years of life lost, and 4% of disability-adjusted life-years (DALYs) [5]. With the use of Indo-Asian-specific Basic Mass Index (BMI) cutoff values the prevalence of overweight and obesity were 25% and 10.3% respectively [6]. In the Eastern Mediterranean Region obesity and overweight has reached an alarming level. The prevalence of obesity among adolescents ranges from 15% to 45% with more occurrences in women versus men [7]. Moreover a systematic review of published papers between 1990 and 2011 showed that overweight and obesity in all age groups of the EMR countries ranging from 25% to 81.9% [8]. Literature shows that the prevalence of obesity in Iran 35% [9], in Cyprus 28.8% [10], in United States 30.5% [11], in United Kingdom 23% in men and 24% in women [12]. The main factors associated with overweight and obesity were age, gender, residence, literacy, socio-economic status, dietary habits, physical inactivity, nutrition transition, marital status, breastfeeding, frequent snacking, skipping breakfast, intake of sugary beverages, the incidence of eating outside the home, frequency of viewing television, high fat foods, total serum cholesterol, low density lipoprotein, blood glucose, triglycerides, frequency of intake of fruits and vegetables, level of daily exercise, smoking and more [6-11,13].

In Afghanistan, due to years of war and conflict, few studies have been conducted to estimate the burden of obesity in the country. The in age groups with cutoff point 20 years are 6.8% and 14.8% in males and 4.4%, and 13.8% in women [14]. According to literature the first ever study on overweight was conducted in 1997 in children ≤3 years with the result of 4% prevalence [15]. In 2002 in a provincial study in Afghanistan the prevalence of obesity and overweight in adult females were 1.8% and 11.5% with average BMI of 21.1 Kg/meter square [16]. However recent studies in Kabul and Jalalabad the main big cities in Afghanistan showed that the prevalence of obesity in adult citizens were 31.2% and 27.4% respectively [17, 18]. Kandahar city is another big southern city in the country in which no data is available on overweight and obesity while due

attention is given to infectious diseases, nutrition and maternal health. The main objective of this article is to identify and assess the prevalence and factors associated with obesity in Kandahar city Afghanistan.

## **II. METHODS AND MATERIALS**

We conducted a survey using WHO STEP wise approach [19] to determine the burden of non-communicable diseases in main cities of Afghanistan. In this study we included 1165 subjects to reflect the burden of obesity and its related factors in Kandahar city population targeting adult individuals in age group of 25-70 years of both sexes. Temporary residents (less than six months) and those living in institutionalized settings along with insecure areas were excluded from the survey. After statistical calculation, totally 1200 subjects enrolled in the study. Data was collected during October-November 2015. All permanent household members aged more than 25 years, including men and women who were residents of the cities during the study period and gave consent to participate were included in the study. Temporary residents (resident < 6 months) and those living in institutionalized settings or insecure areas were excluded. Due to the unavailability of previous estimates of risk factor prevalence in this city we assumed the highest prevalence or sample size calculation (50%), 95% confidence interval (CI) and margin of error of 5%. From this we estimated 385 subjects to be included in the survey. Taking into consideration the proportion of other risk factors in similar settings, the number of subjects was increased to 600. Finally, after taking into account the design effect ( $D_{eff} = 2$ ) of cluster sampling the final sample size was increased to  $(2 \times 600) = 1200$  for the city, which was reasonable for achieving the study objectives with limited resources and funding support.

### ***Sampling Techniques and Strategy:***

As a framework the Expanded Programme for Immunization (EPI) list of the clusters was used due to its reliability in Ministry of Public Health. For the sample size, initially we obtained the list of all existed EPI clusters which included village/area name, population, and number of households per cluster. For this survey we used multi-stage cluster sampling. In the first stage, from this list we randomly selected 7 clusters of EPI using random number of excel sheet. In the second stage from each selected Cluster we randomly selected the five areas (called *Area/Guzar*). Later the overall sample of 1200 households distributed among these selected area according to the proportion to the size of household number in each cluster / areas. Finally, the number of households in each area divided by the sample size assigned for each areas, it was enable us to select household systematically.

### ***Data collection:***

According to the plan, two days training was conducted for surveyors followed by a field based session where participants had a chance to fill the questionnaire, measure hypertension and waist circumference and practice taking blood samples from adults under field conditions. A household was defined as a group of people who share the same food pot (not the same roof). In each household the interviewer enumerated all persons who were eligible for our study based on the inclusion criteria. In households with more than one eligible person, we used a lottery system to select the respondent for this survey. In cases of refusal, which was less than 5 %, the interviewer approached the next alternate household. This method provided an equal chance of each member of the household being selected. Various group of targeted data including demographic, behavioural and clinical variables were collected in Kandahar from October 28 to November 4, 2015 by direct interview using the WHO STEP-wise instrument. Anthropometric measurements (height and weight) were used to calculate body mass index (BMI). A BMI of  $\geq 30 \text{ kg/m}^2$  was considered as obese,  $25\text{--}30 \text{ kg/m}^2$  as overweight and  $18.5\text{--}25 \text{ kg/m}^2$  as normal weight [20]. A waist circumference of 94 cm for men and 80 cm for women was considered as central obesity [21]. Systolic blood pressure 140 mmHg and diastolic pressure 90 mmHg were considered as hypertensive [22]. A fasting blood sugar of  $\geq 126 \text{ mg/dL}$  was considered as diabetes mellitus [23]. Following the interview blood samples were collected the next morning after the respondent had fasted for 10–12 hours. Blood samples were transported in cool boxes ( $2\text{--}8^\circ\text{C}$ ) from field to provincial public health directorate (PHD) Laboratory on the day of sample collection. After processing and separation the samples were shipped to Central Public Health Laboratory in Kabul in two consignments by air. Using Cry-vials the samples were coded with ID number of the questionnaire. On arrival in CPHL all serum samples were stored at  $-80^\circ\text{C}$  until biochemical test conducted. Altogether 1165 questionnaires and samples were filled and tested biochemical measurement of triglyceride, cholesterol, and glucose, except 12 samples which were poor and discarded. Afterwards they were shipped to the central public health laboratory in Kabul and stored at  $-80^\circ\text{C}$  for testing. Later, the biochemical measurement of blood lipid and sugar were conducted. Data were entered in *Epi-info*, version 7, and cleaned data was analysed using *SPSS*, version 20 [24].

### ***Ethical Consideration***

The study protocol was approved by the institutional review board (IRB) of the Ministry of Public Health. After an explanation of the survey, informed consent was taken from each individual before the

interview. The literate read and signed the informed consent while for illiterates the informed consent was read for interviewer and finger print was taken.

### III. RESULTS

One thousand one hundred and sixty-five people were included in analysis after final cleaning of dataset and out of them 597 (51.2%) were females and 568 (48.8%) males with a mean age of  $38.3 \pm 11.2$  years. More than two third (73.2%) of the study participants were illiterates; 42% of the participants had income of less than 10000 AFN (USD150); 79.3% were married and more than 88.5% of women were housewives. Proportion of cigarette smokers and mouth snuffers among study subjects were 9.7% and 16.7% respectively. More than half of study subjects (59.7%) of respondents ate fruits less than 3 days per week and 40.3% ate vegetables less than three days per week. One third of study subjects (33.3%) took solely liquid oil in their kitchen while 37% took solely solid oil for cooking. Approximately six percent (5.9%) of study subjects performed strong physical activity and 21.3% of reported doing moderate physical activity. Table 1 shows the description of main factors collected and are associated with obesity. Using the traditional BMI cutoff values recommended by World Health Organization (WHO) the prevalence of underweight, normal weight, overweight, obesity grade I, obesity grade II and obesity grade III were 4.9%, 44.8%, 34.3%, 11.2%, 2.9% and 1.9% respectively. Figure 1 shows the spider graph of these proportions. As a combination more than half of the study subjects were overweight and obese while as a whole the prevalence of obesity was 16%. Furthermore it seems that the prevalence of such overweight and obesity were higher in females versus males. This comparison is given in Figure 2. The average body mass index as a whole was 25.71 while the mean and standard deviation (SD) or standard error of the mean (SEM) were increased by increasing the BMI. Table 2 shows the mean and SEM by categorization of BMI. Furthermore the average of total cholesterol, glycerides, high density lipoprotein, low density lipoprotein and fast blood sugar were 183 mg /DL, 154.65mg/DL, 45.85mg/DL, 107.3 mg/DL and 131mg/DL respectively. In another way we could say that level of cholesterol with cut off 190mg/dL and level of triglyceride with cut off 150mg/dL were categorized of them 30.4% had higher cholesterol and 35.7% had higher triglycerides. Furthermore, high level of low density lipoprotein (LDL) with cut of 100mg/dL were 50.9% and high level of high density lipoprotein (HDL) were both 46.6%. Table 3 shows the association of main risk factors and obesity for categorical variables. Age and gender both as non-modifiable variables were associated significantly with obesity. Males were 0.37 times less likely to be obese as compare to females (95% CI: 0.26 – 0.52). Odds of being obese was low in literate as compare illiterate (OR= 0.35, 95%CI: 0.22 – 0.55). Furthermore, subjects who used mouth snuff were 0.50 times less likely to be obese as compare to nonusers (95%CI: 0.30 – 0.84) however we could not found any significant relationship of smoking with obesity. Physical activity at vigorous level was not significantly associated with obesity but moderate physical activity had relationship with obesity. It means that those who were practicing moderate physical activity were 1.65 times more likely to be obese as compare to those who were practicing less (95%CI: 1.16 – 2.36). Furthermore sedentary lifestyle was also associated significantly with obesity (OR=0.65, 95% CI: 0.48 – 0.90). Finally the pathophysiological factors such as high blood pressure (OR=1.94, 95% CI: 1.40 – 2.66) and central obesity (OR=3.66, 95% CI: 2.48 – 5.41) were found to have significant relationship with obesity. The quantitative variables were such as age, gender, taking food outside, moderate physical activity, reclining in hours per day, walking for any reason, height, weight and level of triglyceride were significantly associated with obesity. The mean and SD with p values are shown in table 4. At multivariate model age at lower groups, gender, education level, level of triglycerides, walking time in hours per day, high blood pressure, central obesity were independently associated with obesity. Table 5 reflects the multivariate analysis using binary logistic regression.

### IV. DISCUSSION

The finding of this study shows that the prevalence of obesity in Kandahar city is 16% which is lower as compare to other cities of Afghanistan as well as other countries; however the proportion of overweight (34.3%) were comparable with other studies [6, 17-18, 25-26]. Age and gender both at bivariate and multivariate level of analysis are affecting directly the level of obesity. It seems older age particularly females are at greater risk of higher weights which contributes to other communicable diseases it could be due to low physical activity at higher age groups as well as women are less physically active then men due to cultural context. Similar results regarding age and gender are reported by the studies conducted in a number of Middle East countries such as: Bahrain, Saudi Arabia, Lebanon as well as Pakistan. [26-31]. Illiteracy is high in Afghanistan and it is associated with obesity at both level of analysis. Probably it could means literate group are more health oriented and taking preventive measures and less likely to be obese as compare to illiterate. The health literacy and obesity are shown to have association in other studies [32]. Blood pressure was associated with obesity which shows the adult populations are suffering from different risk factors at the same time. The significant association of obesity and blood pressure are well reported by other studies as well [6, 17, and 18]. The more level of triglycerides were significantly associated with high level of obesity which make the person

vulnerable to cardiovascular diseases. The relationship of plasma lipids with obesity is supported by other studies [33]. Walking as a proxy for physical activity was a factor associated with obesity which is consistent with many other studies [34-35]. At multivariate it we could not found any significant association of diet in terms of taking fruit, vegetables, rice, chicken and meat with obesity. Likewise the association of strong or moderate physical activity was not proved in this study. Beyond all these findings which could be used for formulating interventions we were limited to specific budget which as a constraint could not list all households ahead of study. Moreover some areas were excluded due to security concerns. Although the country has not fully defeated the vaccine preventable as well as other infectious diseases addition of noncommunicable public health problems such as overweight and obesity will challenge the health system with limited resources. Predominantly the concurrence of risk factors for noncommunicable diseases such as overweight and obesity, high blood pressure and diabetes will make conducive environment for high occurrence of double burden of diseases. The results of this study could encourage planners and policy makers to focus on interventions to prevent and control obesity in this urban setting of Afghanistan.

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Figure 1: Graphic Presentation of each category of body mass index

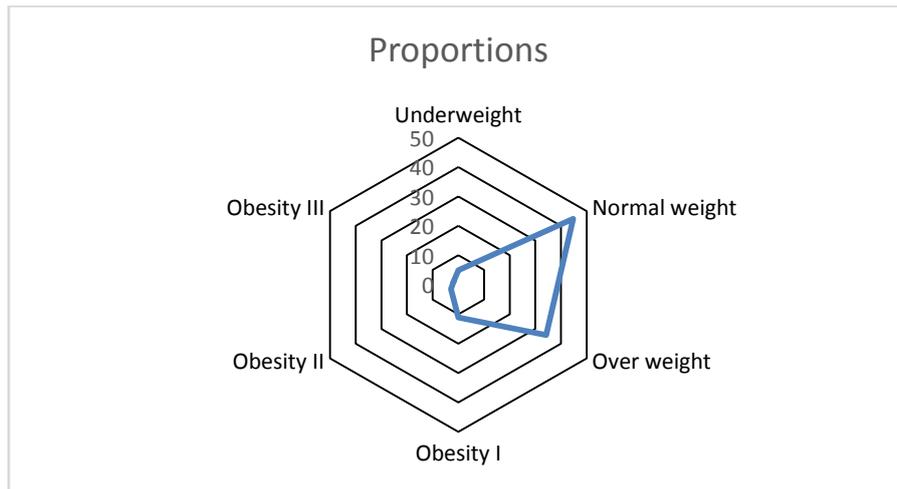
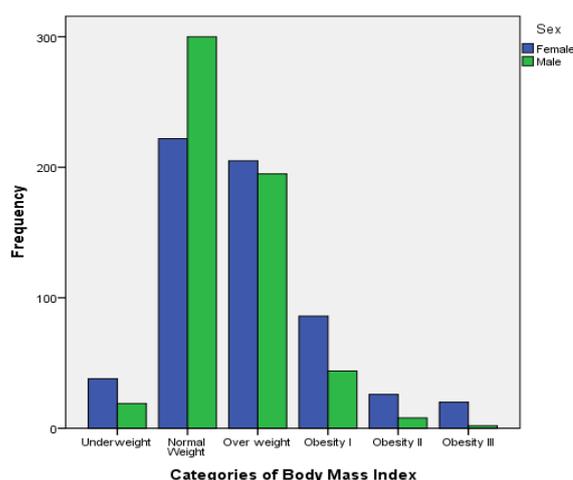


Figure 2: Graphic presentation of BMI categories by sex



Variables	Categories	Total		Female		Male	
		N	%	N	%	N	%
<b>Age in years</b>							
	25-34	248	43.7	520	44.6	272	45.6
	35-44	162	28.5	323	27.7	161	27
	45-54	94	16.5	188	16.1	94	15.7
	55+	64	11.3	134	11.5	70	11.7
<b>Job Categories</b>							
	Official Employees	114	25.7	125	13.8	11	2.4
	Private Business	104	23.4	110	12.1	6	1.3
	Worker/Farmer	130	29.3	130	14.3	0	0
	Jobless	73	16.4	92	10.2	19	4.1
	Housework	5	1.1	414	45.7	409	88.5
	Unable to work	18	4.1	35	3.9	17	3.7
<b>Level of Education</b>							
	Illiterate	307	55.6	840	73.2	533	89.4
	Primary and unofficial	111	20.1	164	14.3	53	8.9
	Secondary school	68	12.3	72	6.3	4	0.7
	High school and over	66	12	72	6.3	6	1
<b>Marital Status</b>							
	Single	95	16.8	120	10.3	25	4.2
	Married	435	76.9	922	79.3	487	81.6
	Widow/Widower	9	1.6	75	6.4	66	11.1
	Divorced	0	0	6	0.5	6	1
<b>Cigarette Smoking Status</b>							
	No	1052	90.3	584	97.8	468	82.4
	Yes	113	9.7	13	2.2	100	17.6
<b>Duration of smoking in years</b>							
	< 10 years	50	42.4	12	63.2	38	38.4
	10 - 20 years	44	37.3	3	15.8	41	41.4
	≥ 20 years	24	20.3	4	21.1	20	20.2
<b>Fruit serving ( days per week)</b>							
	< 3	683	59.7	344	58.3	399	61.1
	≥ 3	462	40.3	246	41.7	216	38.9
<b>Vegetables serving (days per week)</b>							
	< 3	469	40.3	199	33.4	270	47.5

	≥ 3	695	59.7	397	66.6	298	52.5
<b>Type of Kitchen Oil</b>							
	Liquid	380	33.3	151	25.7	229	41.3
	Solid	423	37	266	45.3	157	28.3
	Both	339	29.7	170	29	169	30.5
<b>Vigorous Physical Activity</b>							
	No	1094	94.1	581	97.6	513	90.5
	Yes	68	5.9	14	2.4	54	9.5
<b>Moderate Physical Activity</b>							
	No	914	78.7	434	72.9	480	84.8
	Yes	247	21.3	161	27.1	86	15.2

BMI Categories	Age Group	Number	Mean	SEM
<b>Underweight</b>	25-34	27	16.8295	0.25083
	35-44	12	16.9533	0.34264
	45-54	8	16.7168	0.50165
	55+	10	17.2046	0.31561
	Total	57	16.9055	0.1623
<b>Normal weight</b>	25-34	268	22.0875	0.1003
	35-44	127	22.3841	0.13981
	45-54	77	22.3436	0.19117
	55+	50	22.1716	0.24282
	Total	522	22.2055	0.07176
<b>Overweight</b>	25-34	169	27.1387	0.10572
	35-44	116	27.5802	0.12165
	45-54	69	27.3012	0.16562
	55+	46	27.7509	0.20255
	Total	400	27.3652	0.06853
<b>Obese</b>	25-34	56	34.1843	0.67737
	35-44	68	35.241	0.99556
	45-54	34	33.8964	0.54903
	55+	28	35.5117	1.04271
	Total	186	34.7178	0.45629
<b>Total</b>	25-34	520	24.7588	0.21119
	35-44	323	26.7552	0.36156
	45-54	188	26.0131	0.36371
	55+	134	26.5037	0.54052
	Total	1165	25.7154	0.16387

Questions	Categories	Non-obese	Obese	Odds Ratio	CI 95% LL	CI 95% UL
<b>Age in years</b>						
	25 - 35	464 (89.2)	56 (10.8)	1	Reference	
	35 - 45	255 (78.9)	68 (21.1)	2.21	1.503	3.248
	45 - 55	154 (81.9)	34 (18.1)	1.829	1.151	2.908
	55 and over	106 (79.1)	28 (20.9)	2.189	1.327	3.61
<b>Gender</b>						
	Female	465 (77.9)	132 (22.1)	1	Reference	
	Male	514 (90.5)	54 (9.5)	0.37	0.263	0.52

Level of education						
	Illiterate	682 (81.2)	158 (18.8)	1	Reference	
	Literate	285 (92.5)	23 (7.5)	0.348	0.22	0.551
Smoking						
	No	877 (83.4)	175 (16.6)	1	Reference	
	Yes	102 (90.3)	11 (9.7)	0.54	0.284	1.028
Snuffing						
	No	806 (82.8)	167 (17.2)	1	Reference	
	Yes	171 (90.5)	18 (9.5)	0.508	0.304	0.849
Strong Physical Activity						
	No	925 (84.6)	169 (15.4)	1	Reference	
	Yes	52 (76.5)	16 (23.5)	1.684	0.939	3.019
Moderate Physical Activity						
	No	782 (85.6)	132 (14.4)	1	Reference	
	Yes	193 (78.1)	54 (21.9)	1.658	1.164	2.361
Sedentary lifestyle in hours daily						
	< 3 hours	409 (81)	96 (19)	1	Reference	
	≥ 3 hours	564 (86.6)	87 (13.4)	0.657	0.479	0.902
Fruits serving days per week						
	< 3 days	569 (83.3)	114 (16.7)	1	Reference	
	≥ 3 days	392 (84.8)	70 (15.2)	0.891	0.644	1.233
Vegetables serving days per week						
	< 3 days	399 (85.1)	70 (14.9)	1	Reference	
	≥ 3 days	579 (83.3)	116 (16.7)	1.142	0.827	1.577
High Blood Pressure						
	No	687 (87.1)	102 (12.9)	1	Reference	
	Yes	292 (77.7)	84 (22.3)	1.938	1.408	2.667
Total Cholesterol						
	<190mg%	688 (85.8)	114 (14.2)	1	Reference	
	≥ 190mg%	283 (80.6)	68 (19.4)	1.45	1.042	2.018
Central Obesity						
	No	446 (92.5)	36 (7.5)	1	Reference	
	Yes	463 (77.2)	137 (22.8)	3.666	2.483	5.411

Table 4: Descriptive characteristics of quantitative variables and obesity in survey population in Kandahar city						
Variables	Obesity	N	Mean	SD	P values	
Age in years	No	979	37.93	11.277	0.005	
	Yes	186	40.45	10.997	0.005	
Fruits taking days per week	No	961	3.35	1.619	0.784	
	Yes	184	3.31	1.889	0.805	
Vegetables taking days per week	No	978	3.94	1.683	0.532	
	Yes	186	4.02	1.786	0.549	
Red meat taking days per week	Yes	951	1.79	1.176	0.368	
	No	178	1.7	1.082	0.342	
Chicken taking days per week	Yes	944	1.41	0.943	0.534	
	No	173	1.46	0.905	0.523	
Rice taking rice days per week	Yes	963	2.72	1.303	0.212	
	No	182	2.59	1.559	0.270	
Taking food outside home day per week	No	712	0.87	1.573	0.003	
	Yes	115	0.42	1.034	0.000	
Strong physical activity days per week	No	50	4.14	1.895	0.544	

	Yes	14	3.79	2.007	0.561
<b>Moderate physical activity days per week</b>	No	181	2.83	1.414	0.865
	Yes	53	2.87	1.687	0.878
<b>Moderate physical activity hours per day</b>	No	181	1.98	1.491	0.022
	Yes	54	2.69	3.107	0.111
<b>Pedal or bicycle riding hours per day</b>	No	805	1.79	3.197	0.039
	No	141	2.4	3.533	0.056
<b>Reclining hours per day</b>	Yes	973	4.39	2.465	0.003
	No	183	3.8	2.228	0.001
<b>Walking (any reasons) in hours per day</b>	Yes	945	7.83	14.248	0.047
	No	184	10.09	13.575	0.041
<b>Height in centimeters</b>	Yes	979	166.59	11.15	0.000
	No	186	153.85	14.846	0.000
<b>Weight in kilogram</b>	Yes	979	66.63	11.372	0.000
	No	186	81.15	11.029	0.000
<b>Triglyceride</b>	No	971	151.77	89.087	0.019
	No	182	170.01	128.678	0.068
<b>Cholesterol</b>	Yes	971	181.88	51.552	0.087
	No	182	189.27	62.635	0.135
<b>High density lipoprotein</b>	Yes	971	45.67	13.343	0.321
	No	182	46.79	16.869	0.398
<b>Low density lipoprotein</b>	Yes	969	106.57	38.194	0.155
	No	181	111.2	49.412	0.233
<b>Fasting blood sugar</b>	Yes	971	133.61	119.46	0.209
	No	182	121.83	95.843	0.146

Variables	Categories	B	Exp(B)	CI 95% Lower Limit	CI 95% Upper Limit	P Value
<b>Age group in years</b>						
	<b>25-34</b>		1	Reference		
	<b>35-44</b>	0.609	1.838	1.102	3.065	0.02
	<b>45-54</b>	0.013	1.013	0.542	1.896	0.967
	<b>55 and more</b>	0.472	1.603	0.841	3.055	0.151
<b>Sex</b>						
	Male		1	Reference		
	Female	0.521	1.684	1.002	2.831	0.049
<b>Education Status</b>						
	Literate		1	Reference		
	Illiterate	0.849	2.337	1.236	4.418	0.009
<b>Triglycerides</b>		0.004	0.644	0.412	1.005	0.053
<b>Walking in hours per day</b>		0.078	1.082	1.024	1.142	0.005
<b>High blood pressure</b>						
	Yes		1	Reference		
	No	-0.44	0.053	0.644	0.412	0.000
<b>Central Obesity</b>						
	Yes		1	Reference		
	No	-1.262	0.283	0.158	0.508	0.000