Risk Factors and Prevalence of Diabetes: A Cross Sectional Study in Kabul, Afghanistan 2015

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Abstract

Objective: Burden of diabetes is increasing worldwide. National statistics on prevalence of diabetes in Afghanistan are insufficient. Thus, this study identified the prevalence of diabetes and key risk factors in Kabul, Afghanistan.

Materials and Methods: Totally 1172 records were cleaned for analysis of whom 599 (51.1%) were females and 573 (48.9%) were males with a mean age of 38.6±12.2 years. The research team used WHO STEP wise approach along with cluster sampling method in Kabul, capital of Afghanistan. Data were collected on demographic, dietary habits, risk factors of noncommunicable diseases and physical characteristics using a structured questionnaire. Blood samples were collected and tested for fasting blood sugar. The prevalence of diabetes with differentiation of main factors identified. Statistical analysis conducted to examine the associations between different risk factors and diabetes.

Results: The cleaned database containing complete data for analysis enclosed 1172 records. The overall prevalence of diabetes was 9.1% with differentiation of 8.9% in males and 9.3% in females. Furthermore 7.7% were undiagnosed with 1.4% were under treatment. Literacy rate was 50.4%, marriage was 77.5% and 60% of women were housewives. Prevalence of smoking and mouth snuff use were 8.1% and 9.8% respectively. Age, moderate physical activity, blood pressure and central obesity were associated with diabetes.

Conclusion: This study found that one tenth of adults in Kabul are suffering from diabetes in the surveyed population. Age, hypertension, central obesity and moderate physical activity were significantly associated with diabetes. Focus on diabetes and its risk factors along with nationwide study using WHO STEP wise tools are recommended**.**

Keywords: Prevalence, Diabetes; Risk factors; Kabul, Afghanistan.

Introduction

Diabetes is a chronic metabolic disorder which is enlisted in priority noncommunicable diseases (NCDs) and characterized by high levels of glucose in the blood (1-2). Factors such as lifestyle, genetic makeup and environment are contributing in development of this complex situation (3-4). The prevalence of diabetes is

growing worldwide as reported from 4.7 to 8.5% during 34 years in 2014 (5). In 2014 globally 422million people had diabetes while it is estimated to rise to 592 million in 2035. The greatest proportion (77%) of people with diabetes live in low- and middle-income countries. Diabetes caused 4.9 million deaths in 2014 meaning every seven seconds a person dies from diabetes (6).

The prevalence of diabetes was highest (14%) in the Eastern Mediterranean Region and lowest in the European (8%) and Western Pacific Regions (9%) (7). In South Asia, almost half of people with diabetes are undiagnosed and the prevalence of diabetes is rising faster than in any other region in the world (8). India has the highest burden of diabetes as reported the prevalence of diabetes is increasing from 5 to 15% among urban populations, 4 to 6% in semi-urban populations, and 2 to 5% in rural population (9). The burden of diabetes is highest in Arabs world. For instance, the prevalence is 21.4% in Kuwait, 15.6% in Saudi Arabia and 11.8% in Oman (10-11). Factors such as educational level, smoking, obesity, cholesterol level, systolic blood pressure, sedentary life style were associated with diseases (11-12).

In countries neighboring Afghanistan the proportion of diseases is not much different from other parts of the world. The prevalence of diabetes in Iran was 8.7 %(13), in China was 5.5% (14), in Pakistan was 12.14% (15).

In Afghanistan, as a result of war and conflict there are no sufficient epidemiological data on health problems. However, the prevalence of diabetes is estimated to be 8.6% in 2010 and 8.8% in 2015 and estimated to be 9.9% in 2030 in age group between 20-79 years (16-17). There were some cross sectional studies in provinces which reported the prevalence of NCDs including diabetes. For instance, results reflected that the prevalence of diabetes was 13.2% in Kabul (age group of ≥40 years) (18), 11.8% in Jalalabad (19), 9.9% in Hirat (20) and 22.4% in Kandahar (21). This paper was conducted to identify the prevalence and risk factors associated with diabetes among adult in Kabul, capital of Afghanistan.

Materials and Methods

The study was conducted in November, 2015 among Kabul citizens. Kabul is consisting of 15 districts including Kabul city which has further been divided into 22 districts. The total population for Kabul in 2015 is estimated to be 4,372,977 of which 2,259,199 are males and 2,113,778 females. In this study we have included the urban portion of city which its population is estimated to be 3,678,034 with differentiation of 1,903,655 females and 1,774,379 males (22). The main design was a cross-sectional study in November 2015 using the WHO STEP-wise approach. This tool contains three steps including measures of behavioural risk factors, physical measurements and biological risk factors (23). Adult men and women being permanent residents, agree to participate and age group of 25-70 years were included in the study. Also provisional residents (resident< 6 months), institutionalized inhabitants, settings and insecure areas were excluded.

Sampling Size and Strategy

In order to estimate the sample size the prevalence of diabetes in mentioned age group was inadequately clear, therefore assuming the highest prevalence (50%), 95% confidence interval (CI) and margin of error of 5%, a sample size of 385 subjects was calculated for the study. Though, considering the prevalence of other risk factors and design effect (D_{eff} of 2) of cluster sampling the final sample size was increased to 1200 for the city. This sample size is consistent with other studies for the same purpose.

Due to unavailability of complete list of villages in the city the team preferred to use the 2015 Expanded Programme for Immunization (EPI) list of clusters for sampling. Presently, the EPI list of clusters, areas and villages is practically used for immunization in Ministry of Public Health in Afghanistan. Considering the multistage

cluster sampling, in the first stage from the list we conventionally selected five districts using random number in excel sheet. From each selected district we randomly selected 2 clusters. The overall sample of 1200 household distributed among these selected areas according to the proportion to the size of household number.

Variables and Data collection

Demographic, socioeconomic, behavioral and physical measurements were main variables which were part of the questionnaire used by interviewers. A household was defined as a group of people who share the same food pot (not the same roof). A fasting blood sugar of ≥ 126 mg/dL was considered as diabetes mellitus (24). Height and weight were measured and used to calculate body mass index (BMI). A BMI ≥ 30 kg/m^2 was considered as obese, 25–30 kg/m^2 as overweight and 18.5–25 kg/m^2 as normal weight (25). A waist circumference of 94 cm for men and 80 cm for women was defined as central obesity (26). Systolic blood pressure (SBP) 140 mmHg and diastolic pressure (DBP) 90 mmHg were considered as hypertensive. SBP of 120 -140 mmHg and DBP of 80-90 mmHg were reflected as pre-hypertensive (27). After face to face interview, the next morning after being fasted for 10-12 hours, the venous blood samples were collected and transported in cold boxes (2-8°C) from field to Central Public Health Laboratory (CPHL) in Kabul. At CPHL the samples were stored at -80°C and later on were tested for blood lipids and glucose. The cut off for total biochemical markers were defined as: cholesterol 190 mg/dL, low density lipoprotein (LDL) 100 mg/dL, high density lipoprotein (HDL) for male 40 mg/dL and female 50 mg/dL, and triglycerides 150 mg/dL. The study was granted approval by the institutional review board (IRB) of the Ministry of Public Health and informed consent was taken from each study subjects ahead of the interview. Data were analyzed using the Statistical Package for Social Science software (SPSS Version 20.0). Student's t test and chi-square were used to ascertain the significance of differences of mean values between two variables. At first we used univariate analysis for differences in proportions of categorical variables between two groups. Multiple logistic regression analysis was applied in stepwise using the Enter method. Variables found to be associated with diabetes in the univariate analysis were included in multiple logistic regression models. A *P*-value of <0.05 was considered to be significant.

Results

The cleaned database containing complete data for analysis enclosed 1172 records. The

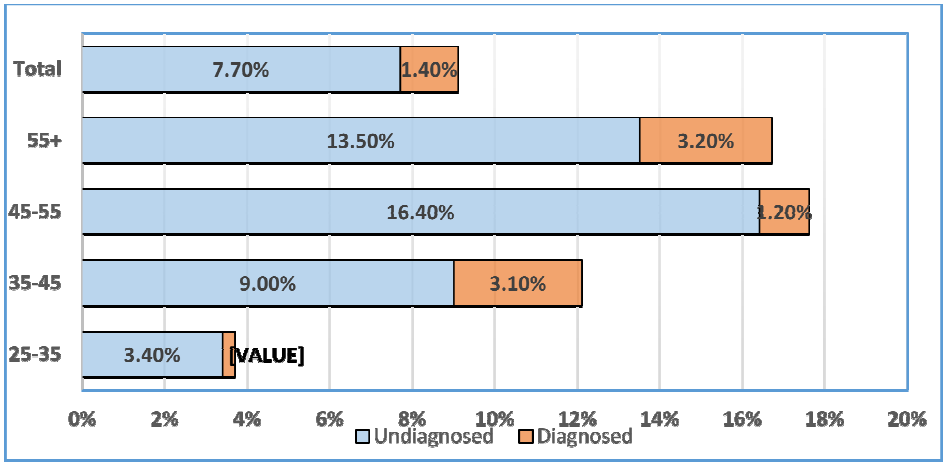

Figure 1. Proportion of diagnosed and undiagnosed diabetes by age groups, study participants, Kabul 2015

overall prevalence of diabetes was 9.1% with differentiation of 8.9% in males and 9.3% in females. Furthermore 7.7% were undiagnosed with 1.4% were under treatment. The magnitude of diagnosed and undiagnosed prevalence of diabetes with respect to each age group is explained in figure 1. This ratio is high in age group of 45 to 55 (1:13.7) and lowest in age group of 25-35 years (1:2.9). In addition, as can be seen in figure 2 the distribution of fasting blood sugar is slightly skewed to right showing high level of sugar in few participants. Descriptive analysis showed that 599 (51.1%) were females and 573 (48.9%) males with overall mean age of 38.6±12.2 years. The mean age of male and female were different across all age groups. Literacy rate was 50.4%, rate of marriage was 77.5% and 60% of women were housewives. Tobacco smoking were determined by level of cigarette smoking and use of mouth snuff. Prevalence of smoking and mouth snuff use were 8.1% and 9.8% respectively. This finding was more prevalent in men against women (Table 1).

Proportion of having fruits and vegetables using 3 days' cutoff per week was 60 and 65% respectively. Among age groups having fruits and vegetables had no significant difference. More than half (52%) of the participants used solid oil and 33% used liquid oil for cooking in their kitchen. Use of solid oil for cooking was close to 50% almost in all age groups. Nearly 10% of the respondents practiced vigorous physical activity and double of that reported practicing moderate physical activity. Vigorous and moderate physical activities were lowest in highest age group. Smoking cigarettes and using mouth snuff was more prevalent in age group of 45-55 years as compare to other age groups (Table 2).

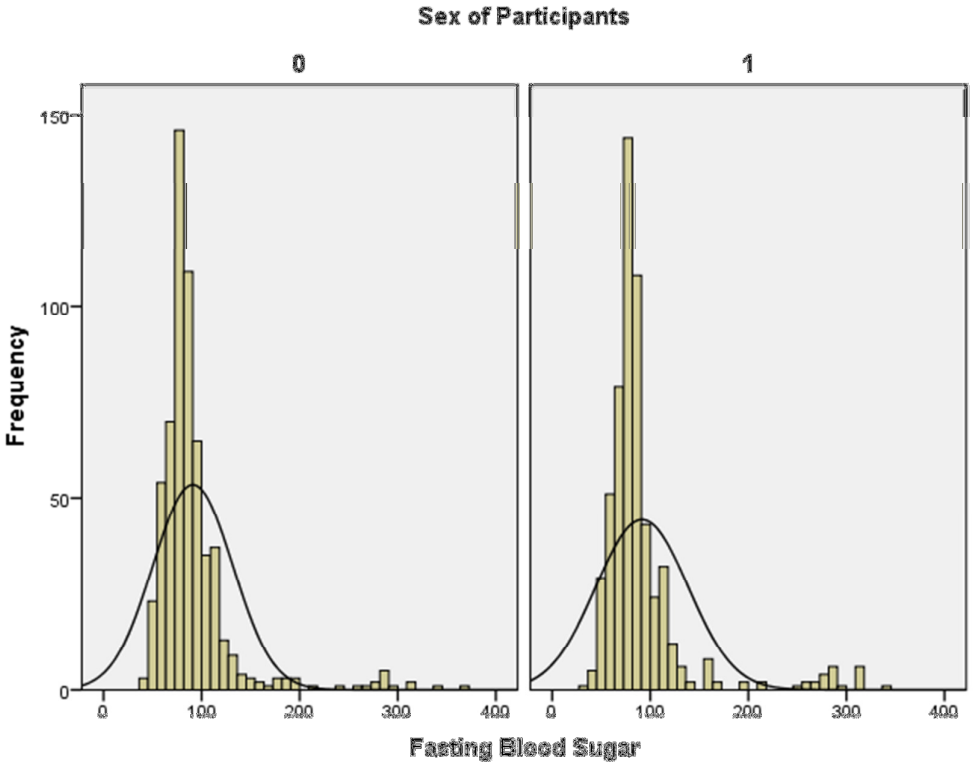

Figure 2. Distribution of fasting blood sugar among adult citizens by sex group (Male=1, Female=0) study participants, Kabul 2015

Table 1. Demographic characteristics and socioeconomic of the study participants, Kabul (N=1172)

Variables	Categories	25-34 years		35-44 years		45-54 years		55+ years	
		N	%	N	%	N	%	N	%
Sex									
	Female	301	51%	158	55%	89	54%	51	51%
	Male	291	49%	131	45%	76	46%	75	49%
	Total	592	100%	289	100%	165	100%	126	100%
Level of Education									
	Illiterate	257	45%	154	57%	82	52%	82	68%
	Primary and unofficial	96	17%	55	20%	34	22%	17	14%
	Secondary school	139	24%	43	16%	31	10%	13	11%
	High school and over	78	14%	20	7%	11	7%	9	7%
	Total	570	100%	272	100%	158	100%	121	100%
Job Categories									
	Official Employees	98	17%	43	15%	22	13%	173	8%
	Students	17	3%	0	0%	0	0%	17	0%
	Private Business	25	4%	12	4%	10	6%	55	6%
	Worker/Farmer	35	6%	25	9%	8	5%	77	7%
	Jobless	28	5%	17	6%	7	4%	61	7%
	Housework	187	31%	108	37%	51	32%	368	18%
	Unable to work/no response	200	34%	82	29%	66	40%	415	54%
	Total	590	100%	287	100%	164	100%	1166	100%
Cigarette Smoking									
	No	538	91%	263	91%	154	93%	120	95%
	Yes	52	9%	26	9%	11	7%	6	5%
	Total	590	100%	289	100%	165	100%	126	100%
Marital Status									
	Single	127	22%	8	3%	0	0%	1	1%
	Married	415	71%	247	87%	140	86%	95	76%
	Widow/Widower	2	0%	10	4%	19	12%	23	18%
	Divorced	0	0%	1	0%	2	1%	3	2%
	Refused	43	7%	17	6%	1	1%	4	3%
	Total	587	100%	283	100%	162	100%	126	100%
-									
	No	555	95%	256	89%	145	88%	96	76%
	Yes	32	5%	32	11%	20	12%	30	24%
	Total	587	100%	288	100%	165	100%	126	100%

More than half (57.5%) of study subjects were either overweight or obese and 60% central obesity. One third of study subjects (32.2%) had high blood pressure. There was significant difference in mean of age among diabetes and no diabetes (*P*-value of <0.0001). Moreover, the average waist circumference, average systolic blood pressure, average high density lipoprotein and fasting blood sugar were statistical different among both study participants with and without diabetes. Having fruits and vegetables in average number of days per week, practicing vigorous and moderate physical activity in average number of days per week and average LDL, total glycerides and total cholesterol had no relationship with diabetes (Table 3).

Table 4 shows the statistical relationship of demographic and socioeconomic factors and diabetes among study subjects. Odds ratio of being diabetes was 3.57 (95%CI: 2.05 – 6.21), 5.52 (95%CI: 3.08 – 9.92) and 5.18 (95%CI: 2.75 – 9.76) higher in age group of 35-45 years and 45-55 years and ≥55 years as compare to 25-35 age categories. There were no statistical association between level of education, gender, income, smoking, snuffing and taking fruits, vegetables and table salt with diabetes. Yet there was statistically significant association between moderate physical activity and diabetes OR=1.69 (95%CI: 1.08 – 2.63). High blood pressure and central obesity were associated with diabetes OR=2.22 (95%CI: 1.49 – 3.32) and OR= 1.63 (95%CI: 1.06 – 2.51) respectively. Furthermore, proxies for

Table 2. Frequency distribution of behavioral risk factors among the study participants, Kabul city

Groups	Sub-groups	25-34 years		35-44 years		45-54 years		55+ years	
		N	%	N	%	N	%	N	%
Cigarette Smoking Status									
	No	538	91.2%	263	91.0%	154	93.3%	120	95.2%
	Yes	52	8.8%	26	9.0%	11	6.7%	6	4.8%
	Total	590	100.0%	289	100.0%	165	100.0%	126	100.0%
Mouth Snuff Status									
	No	555	94.5%	256	88.9%	145	87.9%	96	76.2%
	Yes	32	5.5%	32	11.1%	20	12.1%	30	23.8%
	Total	587	100.0%	288	100.0%	165	100.0%	126	100.0%
Fruit taking (days per week)									
	< 3	373	64.6%	191	68.5%	110	71.9%	76	62.8%
	≥ 3	204	35.4%	88	31.5%	43	28.1%	45	37.2%
	Total	577	100.0%	279	100.0%	153	100.0%	121	100.0%
Vegetables taking (days per week)									
	< 3	381	65.2%	186	64.6%	105	65.2%	84	67.2%
	≥ 3	203	34.8%	102	35.4%	56	34.8%	41	32.8%
	Total	584	100.0%	288	100.0%	161	100.0%	125	100.0%
Type of Kitchen Oil									
	Liquid	207	35.1%	85	29.7%	61	37.4%	35	28.0%
	Solid	311	52.7%	151	52.8%	76	46.6%	69	55.2%
	Both	69	11.7%	50	17.5%	25	15.3%	21	16.8%
	No Response	3	0.5%	0	0.0%	1	0.6%	0	0.0%
	Total	590	100.0%	286	100.0%	163	100.0%	125	100.0%
Vigorous Physical Activity									
	No	534	90.7%	255	88.5%	147	89.6%	121	96.0%
	Yes	55	9.3%	33	11.5%	17	10.4%	5	4.0%
	Total	589	100.0%	288	100.0%	164	100.0%	126	100.0%
Moderate Physical Activity									
	No	473	80.3%	215	74.9%	127	77.0%	115	91.3%
	Yes	116	19.7%	72	25.1%	38	23.0%	11	8.7%
	Total	589	100.0%	287	100.0%	165	100.0%	126	100.0%
Reclining/siting (hours per day)									
	< 3	321	56.7%	156	56.5%	76	48.7%	44	35.5%
	≥ 3	245	43.3%	120	43.5%	80	51.3%	80	64.5%
	Total	566	100.0%	276	100.0%	156	100.0%	124	100.0%

physical activities and blood lipids as categorized and body mass index were not associated with diabetes at this level (Table 5).

Discussion

As reported in this study the overall prevalence of diabetes in Kabul was estimated 9.13% (95% CI: 7.47-10.78). This percentage seems higher the estimation of diabetes prevalence (8.8%) in 2015 for Afghanistan (17). Present study was the second epidemiological and cross-sectional study to identify the burden of diabetes among Kabul citizens in the country. High proportion of (9.13%) of diabetes prevalent in adult population in the capital of the country is important for planners and policy makers. Findings is lower in previous Kabul study (18) which is probably due to age difference, however it is lower than Jalalabad study as well (19). Furthermore, the finding is similar with Hirat study (9.9%) while it is less than Kandahar city (21) which require further analytical studies. The results regarding prevalence of diabetes in Kabul is consistent with other studies in neighboring countries (9,16,26-27). Age was associated with diabetes as a quantitative variable and categorical variable using relevant statistical tests. It means age was a significant non-modifiable factor which influenced the prevalence of diabetes and increased with older ages. Many studies have proved this claims (16-21). We could not find associated of diabetes and gender however it has been supported to have the significance difference at national (18) and outside of the country (27). Systolic Blood pressure as quantitative

variable and hypertension as categorical variable was significantly associated with diabetes. Other studies in Kabul, Jalalabad Kandahar are supporting this findings (18-21). Physical activity did not affect diabetes except moderate physical activity, however such association is reported at national and international levels (18,28-30).

The study reported the important finding using blood collections and testing of fasting blood sugar which could contribute in estimation of diabetes in the country. It will help health authorities in Kabul as well as other provinces to design and implement preventive strategies and intervention to prevent and control NCD including diabetes. Although we had some limitations including financial constraints for covering the cost of listing the households ahead of field work. In addition, anthropometric measurements and checking

Table 3. Quantitative characteristics of study Participants in Kabul, 2015

Parameters	Diabetes Status	N	Mean	Std. Deviation	Std. Error Mean	*P*-value
Age in years	**No**	1065	37.83	12.01	0.368	0.000
	Yes	107	46.07	12.057	1.166	
Fruits in days per week	**No**	1029	3.08	1.865	0.058	0.990
	Yes	101	3.08	2.125	0.211	
Vegetables days per week	**No**	1053	3.09	1.729	0.053	0.816
	Yes	105	3.13	1.754	0.171	
Strong Physical Activity in days per week	**No**	97	3.72	2.035	0.207	0.315
	Yes	9	3	2.236	0.745	
Moderate Physical Activity in days per week	**No**	200	3.98	2.296	0.162	0.928
	Yes	30	3.93	2.599	0.474	
Height in centimeter	**No**	1065	162.36	10.963	0.336	0.452
	Yes	107	161.52	11.428	1.105	
Weight in kilogram	**No**	1065	68.44	11.958	0.366	0.255
	Yes	107	69.83	12.698	1.228	
Waist in circumference in centimeter	**No**	1065	92.59	15.773	0.483	0.002
	Yes	107	97.56	18.648	1.803	
BMI	**No**	1065	26.14	5.298	0.162	0.101
	Yes	107	27.04	6.249	0.604	
Average SBP in mmHg	**No**	1065	125.51	16.494	0.505	0.000
	Yes	107	132	18.735	1.811	
Average DBP in mmHg	**No**	1065	80.13	13.214	0.405	0.005
	Yes	107	83.92	12.52	1.21	
Total Triglyceride in mg/dL	**No**	1065	163.22	93.056	2.851	0.173
	Yes	107	176.1	94.984	9.182	
Total Cholesterol in mg/dL	**No**	1065	177.77	43.513	1.333	0.072
	Yes	107	185.88	52.309	5.057	
HDL in mg/dL	**No**	1065	45.18	14.147	0.434	0.022
	Yes	107	49.21	35.677	3.449	
LDL in mg/dL	**No**	1065	100.16	29.688	0.91	0.133
	Yes	107	104.77	35.244	3.407	
Fasting Blood Sugar in mg/dL	**No**	1065	80.86	17.401	0.533	0.000
	Yes	107	194.79	79.155	7.652	

and testing blood pressure and blood samples could stimulate the citizens to be enrolled in the study and overestimate the findings. There is a need to plan and conduct a nationwide study to identify the prevalence of main NCD in the country and reflect the national burden of diseases with support of World Health Organization. Public awareness and health education proved intervention to reduce such prevalent health problems.

Conclusions

This study found that one tenth of adults in Kabul are suffering from diabetes in the surveyed population. Age, hypertension, central obesity and moderate physical activity were significantly associated with diabetes. Focus on diabetes and its risk factors along with nationwide study using WHO STEP wise tools are recommended**.**

Acknowledgements

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Table 4. Bivariate analysis of bio demographic and socio-economic factors and diabetes among study participants in Kabul Afghanistan

Groups	Subgroups	No-diabetes N	No-diabetes %	Diabetes N	Diabetes %	Odds Ratio	CI 95% LL	CI 95% UL
Age in years								
	25 - 34	570	53.5%	22	20.6%	1	Reference	
	35 - 44	254	23.8%	35	32.7%	3.57	2.053	6.209
	45 - 54	136	12.8%	29	27.1%	5.525	3.078	9.915
	55 and over	105	9.9%	21	19.6%	5.182	2.751	9.76
Gender								
	Female	543	51.0%	56	52.3%	1	Reference	
	Male	522	49.0%	51	47.7%	0.947	0.636	1.41
Level of education								
	Illiterate	520	51.0%	55	53.9%	1	Reference	
	Literate	499	49.0%	47	46.1%	0.891	0.592	1.339
Monthly income (Afghanis)								
	≤ 150USD	13	6.9%	3	13.0%	1	Reference	
	≥ 150USD	175	93.1%	20	87.0%	0.495	0.13	1.887
Smoking								
	No	975	91.7%	100	93.5%	1	Reference	
	Yes	88	8.3%	7	6.5%	0.776	0.35	1.72
Snuffing								
	No	957	90.4%	95	88.8%	1	Reference	
	Yes	102	9.6%	12	11.2%	1.185	0.629	2.235
Strong Physical Activity								
	No	959	90.5%	98	91.6%	1	Reference	
	Yes	101	9.5%	9	8.4%	0.872	0.428	1.779
Moderate Physical Activity								
	No	854	80.6%	76	71.0%	1	Reference	
	Yes	206	19.4%	31	29.0%	1.691	1.084	2.638
Sedentary lifestyle in hours daily								
	< 3 hours	540	53.0%	57	54.8%	1	Reference	
	≥ 3 hours	478	47.0%	47	45.2%	0.932	0.621	1.397
Fruits serving days per week								
	< 3 days	684	66.5%	66	65.3%	1	Reference	
	≥ 3 days	345	33.5%	35	34.7%	1.051	0.684	1.616
Vegetables serving days per week								
	< 3 days	690	65.5%	66	62.9%	1	Reference	
	≥ 3 days	363	34.5%	39	37.1%	1.123	0.741	1.702

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