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Socio-Demographic Association of Multiple Risk Factors and Their Clustering in Urban Population of Adults

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Abstract

Introduction: The purpose of this study was to estimate the prevalence and identify factors associated with simultaneous risk factors occurrence (clustering) for chronic diseases among adults. Methods: A cross-sectional population-based study was carried out with 1977 adults in Sousse, Tunisia. The simultaneous occurrence of tobacco smoking, physical inactivity, inadequate or unhealthy diet, obesity, and high blood pressure was assessed. The independent variables were demographic and socioeconomic characteristics. Results: Overall, 61% of Tunisian adults had two or more unhealthy risk factors compared to only 11% with none of the five risk factors. Prevalence of risk factors was greater in older subjects, females, married, with lower education, unemployed, and those with high socioeconomic status. Risk factors clustered in multiple combinations. The simultaneous presence of all risk factors was 40% higher of what would be expected by combining the individual prevalence of these risk factors. Physical inactivity, unhealthy diet, obesity, and high blood pressure showed the strongest association among the clusters. Conclusion: Multiple chronic disease risk factors are frequent and occur more often than expected among Tunisian adults, especially women, married, older subjects, with low education and high socioeconomic level. Information on high risk groups will help in planning future preventive strategies.

Keywords: Adult; Risk factors; Epidemiologic methods; Preventive medicine; Urban health.

1. Introduction

Chronic non-communicable diseases (CNCDs) such as cardiovascular diseases, diabetes and cancers claim millions of deaths each year all over the world [1, 2]. A number of risk factors, including tobacco use, physical inactivity, unhealthy diet, obesity, and High Blood Pressure (HBP) contribute majorly to the development of these chronic diseases [1, 3, 4]. More worrisome than the exposure to one risk factor is the simultaneous exposure to more than one of these factors [5]. The clustering of risk factors is usually associated with a higher risk of diseases than can be expected from the added individual effects alone [3].

Furthermore, these risk factors appear to cluster within certain socio-demographic groups [6].

It is important to investigate the clustering of lifestyle risk factors because of possible synergistic health effects. There is some evidence that combinations of lifestyle risk factors are more detrimental to people's health than can be expected from the added individual effects alone, suggesting that the health effects of lifestyle risk factors are multiplicative rather than additive [3]. Furthermore, knowing whether and where risk factors cluster will help health professionals to design more targeted effective intervention strategies. Because of the additional and potential synergistic effects, multiple-behavior interventions promise to have a greater impact on public health than single-behavior interventions [3, 6].

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To date, the occurrence of the clustering of CNCDs risk factors has not been fully investigated, particularly among community. The clustering of risk factors therefore needs further research.

This work aimed to identify the prevalence and the socio-demographic and socioeconomic factors associated with the simultaneous presence of CNCDs risk factors in adults in Sousse, Tunisia.

2. Methods

2.1. Study Design

This was a cross-sectional study to assess the prevalence of chronic disease risk factors in the community. This assessment was part of a community-based intervention to prevent chronic disease risk factors carried out in 2014 in the region of Sousse, Tunisia.

2.2. Population

Sousse is one of the most important governorates in Tunisia. It is the capital of the center east of the country. The city is composed of 15 delegations with 544,413 inhabitants and 124,519 households. We selected 3 delegations to participate in our study on the basis of feasibility and sociodemographic characteristics: Sousse Jawhara, Sousse Riadh and M'saken. We used a random representative sample of 1000 households in the general urban population of these delegations. Then, all adults aged 18 to 65 years and living in these selected households and who were present at data collection were included. The needed sample size was 2000 adults.

2.3. Data Collection

Socio-demographic characteristics and risk factors data have been collected by a pre-tested questionnaire in Arabic. Face-to-face interviews were conducted by trained data collectors to standardize the administration of the questionnaire. Basic Socio-demographics information's were collected from all participants.

Risk factors items were composed of physical activity, obesity, eating habits, smoking status, and blood pressure.

2.4. Measures and Variables

Socio-demographics: Socio-demographic characteristics measured included age, sex, marital status, educational level, type of work and socioeconomic level.

Education Response categories of the highest level of education attained were Li, *et al.* [1] primary, [2] secondary, [3] university.

Marital status Response categories of marital status were Li, *et al.* [1] single, [2] married, [3] divorced or widowed.

Type of work Response categories of work description were 1) non manual work (office work, intellectual work, services, and student), [2] manual work (farming, industrial, construction or other similar type of work), [3] do not work

2.5. Socioeconomic Level

The World Bank usually encourages their researchers to utilize the *asset index* to classify household socio-economic position in middle and low-income countries where household income and expenditure data are unreliable. Researchers use data on household assets to describe household welfare instead of using household income or expenditure data [3].

In our study, participants were asked about the availability of eleven items in their household and its quantity. These household items were Li, *et al.* [1] flushable toilet, [2] electricity, [2] refrigerator, [4] central air conditioning or central heating, [5] air-cooling unit that moves and cools air, [6] washing machine, [7] television (TV), [8] telephone / mobile phone, [9] computer with Internet connection, [10] water safe for drinking, and Dumith, *et al.* [11] automobile / car.

Then *ward method* was used in order to obtain hierarchical socioeconomic level. Three categories were created: low, medium, and high socioeconomic level.

Risk factors: The five risk factors investigated were defined as follows:

-*Obesity: BMI* was determined as the body weight in kilograms divided by squared height in meters (*kg/m2*). Height and waist circumference were measured to the nearest centimeter and weight to the nearest half-kilogram. Obese people were those who had a *BMI* of 30 or more [7].

-*Unhealthy diet:* the subjects who reported consuming fruits and vegetables less than 5 portions per day were considered as having an unhealthy diet.

-*Physical inactivity:* having performed less than 30 minutes of moderate to vigorous activity per day.

-*Smoking:* the participants were asked if they smoked any kind of tobacco. "Smokers" were the participants who responded yes to this question.

-*High blood pressure:* defined as *systolic blood pressure*> 140 *mmHg* and/or *diastolic blood pressure* ≥90 *mmHg* and/or use of antihypertensive medication. Blood pressure was measured by using an *automated sphygmomanometer* with subjects in a seated position, and the mean of 2 repeated measurements was recorded.

2.6. Statistical Analyses

Data were presented as frequencies, means and standard deviations. The *t-test* was used to compare the means of quantitative data. The *chi-square* test was used to identify differences between the risk factor clusters regard to socio-demographic characteristics.

To identify the associated factors with the dependent variable "clustering", we used the *multinomial logistic regression* [8], with estimates of *odds ratio* (*OR*), and respective *95% CI*, with no risk factor as the reference category. The following socio-demographic variables were treated as independent variables: sex, age, education, marital status, type of work, and socioeconomic level.

Finally, to evaluate the most frequent risk factors combinations, the ratio between the observed and expected (O/E) prevalence was calculated for each possible combination, as described by Schuit, *et al.* [9]. The observed proportions of 32 different combinations of risk factors were identified in our sample. The expected prevalence was calculated by multiplying the individual probabilities of each risk factor based on their occurrence in the study population [10]. Therefore, it was possible to investigate which combinations were above or below the expectation, assuming that the risk factors occur independently in the population under study [8-10].

All analyses were performed using *SPSS* software, version 10.0. Significance level p was set at 0.05.

2.7. Ethical Consideration

The study was approved by the Ethics Committee of the University Hospital Farhat Hached, Tunisia. It does not represent any risk for participants who gave their written and informed consent before responding to the questionnaire.

3. Results

A total of 1977 adults were surveyed, including 25.1% (n=497) from Sousse Jawhra, 25.4 % (n=502) from Erriadh, and 49.5% (n=978) from M'saken. The participants consisted of 777 (39%) men and 1200 (61%) women (table 1). The mean age of the participants was 39.83±13.8 years. There was no statistically significant difference in mean age between men and women (p=0.187).

Table 1 displays descriptive statistics of the socio-demographic characteristics.

3.1. Single Risk Factors

The most common single risk factor was physical inactivity with a prevalence of 60.4%. Unhealthy diet was the second most common risk factor (40.4%), followed by high blood pressure (33.4%), obesity (31.4%), and smoking (20.7%). (Table 1)

3.2. Cluster Analyses

In table 3 the observed and expected prevalence of risk factors in the population is depicted. The proportion of subjects having five risk factors was higher than can be expected on the basis of the individual frequencies (O/E ratio =1.4). This indicates a 40% increase in subjects with five risk factors over that which would be expected if the risk factors were independent (table 2).

The greatest degree of clustering occurred in a two risk factors pattern comprised of physical inactivity and unhealthy diet (O/E ratio: 1.14).

Regarding the simultaneity of the three risk factors, the combination of physical inactivity, obesity and high blood pressure showed the highest degree of clustering with a ratio of 2.08.

As for the simultaneous occurrence of four risk factors, the most prevalent was the simultaneous exposure to unhealthy diet; physical inactivity, obesity and high blood pressure (3.9%) with a ratio of 2.25. Three of the four risk factors combinations were more prevalent than expected (Table 2).

Four clusters were identified based on five risk factors. About 11% of the population did not have any risk factor, whereas approximately 30% had three or more.

The likelihood of adults having one risk factor when compared with those without any risk factor almost doubled for men, older adults, with high socioeconomic level and unemployed. The likelihood of individuals having two risk factors, when compared with the reference group was approximately two times higher among men, older adults, less educated and unemployed. The prevalence of having three risk factors was greater among men, older adults, less educated and unemployed and lesser among single adults and those with moderate socioeconomic level. The odds of adults having four or five risk factor simultaneously was almost 3 times higher among men, 5 times among adults aged 50 years or more, and more than 2 times among unemployed and less educated subjects. All the tested interactions were statistically significant (table 3).

4. Discussion

Aiming for more investigation on the clustering of risk factors of CNCDs, we have analyzed data from a cross sectional survey conducted among adults in the region of Sousse.

Three major findings can be highlighted. First, the occurrence of the studied risk factors in the population is high: 89.1 % of the adults in Sousse reported at least one risk factor for CNCDs. Second, the simultaneous occurrence that indicated a greater increase than that expected at random was the simultaneous exposure to unhealthy diet, physical inactivity, obesity and high blood pressure. Finally, the most vulnerable groups to the simultaneous occurrence of three or more risk factors for CNCDs were: men, adults aged more than 50 years, who are married, who do not work, less educated and those with high socioeconomic level.

The prevalence order of risk factors in our study is similar to the findings from high income countries. Data from the EpiFloripa study [8] conducted with 1720 adults aged between 20 and 59 showed that the two most common risk factors were low level of physical activity and poor diet. The Morgen study and a population-based survey derived from the 2003 Health Survey for England showed the same pattern [6, 9].

Thus far, the analysis of lifestyle risk factors in Tunisia has been limited to individual risk factors and their relationship with socio-demographic factors. This was one of the few studies to explore the socio-demographic and socioeconomic differences in clusters of CNCD-related risk factors in Tunisian urban adults.

Four distinct clusters were identified based upon five risk factors of interest. At least two factors were present in 32.8% of the respondents, about one-quarter of the sample were characterized as having three risk factors, and only 7% as having four or five risk factors.

Regarding the combination of simultaneous risk factors for CNCD, the most frequent pattern was the simultaneity of unhealthy diet and physical inactivity (10.77%). In Holland [9], 57.7% of men and 52.9% of women had at least two of the four risk factors of this study (the most prevalent are physical inactivity and low consumption of fruits/vegetables for both sexes).

Using the O/E ratio method, we found significant clustering of risk factors among adults with four risk factors confirming results from a Brazilian adult study [8], as well as from other studies conducted in adolescents [10-12].

The greatest degree of clustering occurred in a four risk factors pattern comprised of physical inactivity, unhealthy diet, obesity, and high blood pressure. It represents an increase of 225% of what would be expected randomly. In the adult population in Holland [9] and England [6], the observed prevalence was 170% and 200% higher than what would be expected if the four risk factors were independent.

Six socio-demographic variables: age, sex, marital status, education, type of work and socioeconomic level, had significant and independent roles to distinguish these four clusters of adults. Our findings indicate that high risk profiles are more prevalent among men, older age group, unemployed subjects, and those with lower education but less prevalent among single and lower socioeconomic level.

As with results from other populations men, in general, showed more prone to present risk factors than women [1, 3, 8].

Researchers who have addressed gender differences reported that socioeconomic and cultural factors can influence these behaviors [13]. This is an issue of concern if we take into account that men make use of health services less frequently, especially for health prevention, and the higher morbidity and mortality from cardiovascular diseases that men have compared with women [8].

When comparing our data with those on the North American [14] and Chinese population [1], similar results were observed regarding the age. The prevalence of having multiple risk factors was higher among older adults. This result may be attributed to the young's lack of concern with CNCDs; because of the insidious course of these diseases, they usually manifest clinically in individuals after 40 years old [9]. This provided critical penetration for the design of targeted public health prevention programs. Numerous previous studies and risk reduction programs have considered adolescents to be a priority since childhood and adolescence are critical periods for behavior formation during which risk factors, especially those related to behavior, are more modifiable than in adulthood [1, 15].

The finding in our study that multiple risk factors are more common in subjects who are unemployed and less educated has been reported before [9, 16]. However, contrary to previous reports [8, 9], we observed a less prevalence of multiple risk factors among single subjects.

Previous studies in both adolescent [12] and the adult population [9, 14, 17, 18] have shown that multiple risk factors were more prevalent among those with low income levels [1]. However, in our study, people with a moderate socioeconomic level were less likely to have three risk factors than higher one. People with higher income levels may be occupied with busy work and engaged in more social activities, like eating out for business or with friends. It is difficult to make the healthiest choices on the menu and resist the temptation to overeat. They are also more predisposed to smoking [3].

It is also important to recognize the limitation of using the asset index for socioeconomic classification. The asset index is better thought of as a proxy for long-term household wealth rather than current per capita consumption. The strong correlation between asset index and money metric measures like income and expenditure was not consistently supported [3].

Most previously reported studies on clustering of risk factors have investigated the clustering of lifestyle risk factors [8-11, 16] and not biological risk factors.

Furthermore the majority of studies are performed in children and adolescents [10-12, 16]. In addition, a few studies have examined the clustering of multiple lifestyle risk factors and their association with socio-demographic characteristics. However, it is difficult to make direct comparisons, as these studies focused on different (combinations of) risk factors and used different measures, different study populations, and different analytical techniques [3].

The finding that multiple risk factors are the norm in the adult population provides strong support for multiple-behavior interventions as opposed to single-behavior interventions [6, 19, 20]. Multiple-behavior interventions may not only have a much greater impact on public health than single-behavior interventions [21], they may also be more effective and efficient at achieving these goals as well [22].

Our study has some limitations. Firstly, its cross-sectional nature precluded causal assertions; so many findings from this study need further confirmation. Also, recall bias may have influenced our results, as all data except the weight and height of participants were collected by self-reported manner. In addition, using more descriptive diet quality measures would have enhanced this study, a matter that can be considered by future studies.

5. Conclusion

This survey provided us with a snapshot of socio-demographic associations of multiple risk factors and their clustering among adults. The tendency for risk factors to aggregate has important implications for health promotion, since the risk associated with aggregated risk factors is higher than can be expected on an additional basis.

Multiple-behavior interventions have a greater impact and are more effective and efficient than single-behavior interventions to prevent chronic diseases. It is time for developing countries to consider the clustering of chronic diseases risk factors in planning future preventive strategies.

What is Already know on This Topic

- Chronic non-communicable diseases (CNCDs) are the main cause of mortality in world and particularly in developing countries.
- Chronic non-communicable diseases (CNCDs) are due to mainly four modifiable risk factors
- The clustering of risk factors is usually associated with a higher risk of diseases than can be expected from the added individual effects alone

What This Study Adds

- The occurrence of chronic disease risk factors in the population of our developing country is alarming: 89.1 % of the adults reported at least one risk factor for CNCDs.
- This paper presents an advanced analysis of the clustering of CNCDs risk factors in an African country
- It is important for developing countries to consider the clustering of chronic diseases risk factors to plan effective preventive strategies.

Competing Interests

The authors declare no competing interest.

Authors' Contributions

Authors HG and JM contributed to the design of the study research protocol. Author HG was the principal investigator. Authors DC, JM, RG, NZ and SBF participated in the coordination of the study and in data collection and entry. DC, RG, NZ and SBF participated in data analysis and manuscript writing. JM and HG validated result. All authors read and approved the final manuscript.

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Tables and Figures

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Table 2: Prevalence of combinations of health risk factors in adult population aged 18-65 years (n=1977).

Table 3: Association between risk factors and demographic and socioeconomic variables in adult population aged 18-65years (n= 1977).

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Table-1. Prevalence of Socio-demographic characteristics and single risk factors in adult population aged 18–65 years

		Study population (n=1977)	
		n	***%(95% CI)***
Socio demographic characteristics			
Sex	*Men*	777	39 (37.2-41.3)
	Women	1200	61 (58.7-62.8)
Age (years)	18-29	566	28.7 (26.7-30.8)
	30-39	412	20.9 (19.2-22.6)
	40-49	428	21.7 (19.9-23.6)
	≥50	568	20.8 (26.7-31)
Education	Primary level	830	42 (39.7-44.3)
	Secondary level	842	42.6 (40.5-44.9)
	University level	305	15.4 (13.6-17)
Marital status	*Single*	508	25.8 (23.9-27.8)
	Married	1351	68.6 (66.5-70.7)
	Widowed, divorced	109	5.5 (4.5-6.5)
Type of Work	Office work, services, student	495	25.1 (23.1-27)
	Farming, industrial, or construction	307	15.5 (14-17.3)
	Do not work	1173	59.4 (57.3-61.5)
Socioeconomic level	Low	1483	75 (73.2-76.9)
	Moderate	131	6.6 (5.4-7.6)
	High	363	18.4 (16.7-20.2)
Risk factors			
Smoking [a]		410	20.7(18.8-22.5)
Unhealthy diet [b]		799	40.4 (38.3-42.6)
Physical inactivity [c]		1195	**60.4 (58.3-62.6)**

Obesity [d]	620	31.4(29.2-33.4)
High blood pressure [e]	660	33.4(31.2-35.5)

Note: CI: Confidence interval, Confidence intervals were computed by bootstrap techniques.
[a] Smoking:smoking any kind of tobacco.
[b] Unhealthy diet: consuming less than 5 portions of fruits and vegetables per day.
[c] Physical inactivity:less than 30 minutes of moderate to vigorous activity per day.
[d] Obesity: Body Mass Index (BMI) ≥ 30.
[e] High blood pressure:systolic blood pressure > 140 mmHg and/or diastolic blood pressure ≥90 mmHg and/or use of antihypertensive medication.

Table-2. Prevalence of combinations of health risk factors in adult population aged 18-65 years (n=1977)

Number of Risk factors	Physical inactivity[a]	Smoking [b]	Unhealthy diet[c]	Obesity[d]	High Blood Pressure[e]	Prevalence		
						O (%)	E (%)	O/E
0	-	-	-	-	-	216(10.93)	9.4	**1.16**
1	+	-	-	-	-	237 (11.99)	14.11	0.85
	-	+	-	-	-	64 (3.23)	2.35	**1.37**
	-	-	+	-	-	101 (5.11)	6.27	0.81
	-	-	-	+	-	66 (3.34)	4.0	0.84
	-	-	-	-	+	81 (4.09)	4.0	1.02
Total						27.76	30.73	0.9
2 *tota*	+	+	-	-	-	66 (3.34)	3.53	0.95
	+	-	+	-	-	213(10.77)	9.41	**1.14**
	+	-	-	+	-	100 (5.06)	6.0	0.84
	+	-	-	-	+	76 (3.84)	6.0	0.64
	-	+	+	-	-	36 (1.82)	1.57	**1.16**
	-	+	-	+	-	6 (0.3)	1.0	0.3
	-	+	-	-	+	34 (1.72)	1.0	**1.72**
	-	-	+	+	-	27 (1.37)	2.69	0.51
	-	-	+	-	+	24 (1.21)	2.69	0.45
	-	-	-	+	+	67 (3.39)	1.73	**1.96**
Total						32.82	34.2	0.96
3	+	+	+	-	-	76 (3.84)	2.35	**1.63**
	+	+	-	+	-	10 (0.51)	1.51	0.34
	+	+	-	-	+	26 (1.32)	1.51	0.87
	+	-	+	+	-	90 (4.55)	4	**1.14**
	+	-	+	-	+	60 (3.03)	4	0.76
	+	-	-	+	+	107 (5.41)	2.6	**2.08**
	-	+	+	+	-	3 (0.15)	0.67	0.22
	-	+	+	-	+	22 (1.11)	0.67	**1.66**
	-	+	-	+	+	7 (0.35)	0.43	0.81
	-	-	+	+	+	25 (1.26)	1.15	1.1
Total						21.53	18.89	**1.14**
4	+	+	+	+	-	6 (0.3)	1	0.3
	+	+	+	-	+	25 (1.26)	1	**1.26**
	+	+	-	+	+	15 (0.76)	0.65	**1.17**
	+	-	+	+	+	77 (3.89)	1.73	**2.25**
	-	+	+	+	+	3 (0.15)	2.9	0.05
Total						6.36	7.28	0.87
5	+	+	+	+	+	11 (0.6)	0.43	**1.4**

O: observed; E: expected.
+ Factor present; −Factor absent.
[a] Physical inactivity: less than 30 minutes of moderate to vigorous activity per day.
[b] Smoking: smoking any kind of tobacco.
[c] Unhealthy diet: consuming less than 5 portions of fruits and vegetables per day.
[d] Obesity: Body Mass Index (BMI) ≥ 30.
[e] High blood pressure: systolic blood pressure > 140 mmHg and/or diastolic blood pressure ≥90 mmHg and/or use of antihypertensive medication.

Table-3. Association between risk factors and demographic and socioeconomic variables in adult population aged 18-65years (n= 1977)

	One risk factor		*Two risk factors*		*Three risk factors*		*Four or five risk factors*	
	n (%)	**OR (95%CI)[a]**	**n (%)**	**OR (95%CI)[a]**	**n (%)**	**OR (95%CI)[a]**	**n (%)**	**OR (95%CI)[a]**
Total	549 (27.8)	(25.9-29.7)	649 (32.8)	(30.7-34.9)	426(21.5)	(19.8-23.4)	137(6.9)	(5.7-8)
Sex								
Women	351(29.3)	**1.0[b]**	395(32.9)	**1.0[c]**	234(19.5)	**1.0[c]**	70(5.8)	**1.0[c]**
Men	198 (25.5)	**1.5 (1.06-2.2)**	254(32.7)	**1.9 (1.3-2.7)**	192(24.7)	**2.6(1.7-3.9)**	67(8.6)	**2.8(1.6-4.7)**
Age								
18-29 years	185(32.7)	**0.4 (0.2-0.7)**	192(33.9)	**0.3 (0.2-0.7)**	75(13.3)	**0.2(0.1-0.4)**	15(2.7)	**0.1(0.03-0.2)**
30-39 years	136(33)	**0.5 (0.2-0.9)**	129(31.3)	**0.5 (0.2-0.9)**	88(21.4)	**0.4(0.2-0.7)**	17(4.1)	**0.2(0.08-0.4)**
40-49 years	113(26.4)	**0.4 (0.2-0.7)**	142(33.2)	**0.4(0.2-0.7)**	87(20.3)	**0.3(0.1-0.5)**	35(8.2)	**0.3(0.1-0.5)**
≥ 50 years	114(20.1)	**1.0[b]**	186(32.7)	**1.0[c]**	174(30.6)	**1.0[c]**	70(12.3)	**1.0[c]**
Education								
primary	198(23.9)	1.2 (0.7 - 2.0)	278(33.5)	**1.71(1.05-2.7)**	212(25.5)	**2.3(1.3-4.1)**	75(9.0)	**2.4(1.1-5.4)**
secondary	244(29)	1.3 (0.9 – 2.1)	283(33.6)	**1.74 (1.1-2.6)**	171(20.3)	**2.2(1.3-3.6)**	50(5.9)	2.0(0.9-4.4)
University	107(35.1)	1.0	88(28.9)	**1.0[b]**	43(14.1)	**1.0[c]**	12(3.9)	1.0
Marital status								
Single	152(29.9)	0.4 (0.1 -1.2)	176(34.6)	0.6(0.2-1.8)	75(14.8)	**0.3(0.1-0.9)**	17(3.3)	0.5(0.1-2.4)
Married	368(27.2)	0.6 (0.2-1.7)	438(32.4)	0.7(0.2-1.8)	312(23.1)	0.4(0.1-1.2)	110(8.1)	0.7(0.2-2.3)
Widowed, divorced	25(22.9)	1.0	33(30.3)	1.0	37(33.9)	1.0	9(8.3)	1.0
Type of work								
Non manual	153(30.9)	**0.6 (0.4-0.9)**	147(29.7)	**0.4(0.3-0.7)**	87(17.6)	**0.5(0.3-0.7)**	25(5.1)	**0.4(0.2-0.9)**
manual	90(29.3)	0.7 (0.4-1.2)	91(29.6)	**0.5(0.3-0.8)**	64(20.8)	**0.5(0.3-0.8)**	25(8.1)	0.6(0.3-1.2)
Do not work	306(26.1)	1.0	411(35)	**1.0[c]**	274(23.4)	**1.0[c]**	87(7.4)	1.0
Socioeconomic level								
Low	387(26.1)	**0.6 (0.4-0.9)**	488(32.9)	0.7 (0.5-1.2)	336(22.7)	0.7 (0.4-1.1)	110(7.4)	0.9(0.4-1.7)
Moderate	41(31.3)	0.6 (0.3-1.1)	48(36.6)	0.7(0.3-1.5)	17(13)	**0.3 (0.1-0.8)**	7.0(5.3)	0.6(0.2-1.8)
High	121(33.3)	1.0	113(31.1)	1.0	73(20.1)	1.0	20(5.5)	1.0

Notes: Risk factors include:Smoking (smoking any kind of tobacco), Unhealthy diet (consuming less than 5 portions of fruits and vegetables per day), Physical inactivity (less than 30 minutes of moderate to vigorous activity per day), Obesity (Body Mass Index (BMI) ≥ 30Kg/m2), High blood pressure (systolic blood pressure > 140 mmHg and/or diastolic blood pressure ≥90 mmHg and/or use of antihypertensive medication).

OR: Odds ratio.

CI: Confidence interval, computed by bootstrap techniques.

[a]Adjusted analysis for all independent variables.

[b]$p < 0.05$.

[c]$p < 0.01$.