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*Title*: Epidemiology of Obesity and Hypertension and Related Risk Factors in Uzbekistan

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HUMAN SUBJECTS INFORMED CONSENT

Analysis presented in this paper is based on an analysis of existing survey data with all identifier information removed. Informed consent was obtained from all respondents in the survey before asking questions and separately before obtaining measurements of height and weight and blood pressure.

ABSTRACT

*Objective*: This study examines the prevalence of obesity and hypertension and associated behavioral risk factors in adult men and women in Uzbekistan. The study also estimates the effects of overweight and obesity on the risk of hypertension.

*Method*: The analysis used data from the 2002 Uzbekistan Health Examination Survey (UHES), which included a nationally representative sample of 2,333 men age 15–59 and 5,463 women age 15–49. The survey included questions on physical activity, dietary habits, tobacco smoking, alcohol consumption, and other risk factors, as well as measurements of height, weight, and blood pressure for all survey respondents. The analysis was conducted using binary and multinomial logistic regression methods, separately for men and women.

*Results*: Thirty-one percent of men age 15–59 and 28% of women age 15–49 in Uzbekistan are overweight or obese. The study found no significant association between physical activity level and the risk of obesity or hypertension. Eating animal source protein and tobacco smoking in the past were positively associated with obesity, but there were no consistent associations with other dietary indicators or alcohol use. Overweight men and women were more than twice as likely and obese men and women were more than six times as likely to suffer from hypertension as men and women with a normal body mass index (BMI). With various risk factors and background factors statistically controlled, obese men and women remained about three times as likely to suffer from hypertension as men and women with a normal BMI (OR=3.01; 95% CI: 1.67–5.44 for men and OR=2.82; 95% CI: 2.05–3.86 for women). The adjusted effects of overweight on hypertension were also smaller than the unadjusted effects, but remained positive and significant (OR=1.35 for men and OR=1.54 for women). For men, the risk of hypertension was strongly positively associated with BMI only at BMI levels above 25 $kg/m^2$, but for women a positive relationship was observed at all BMI levels.

*Conclusion*: The study found a strong positive association between obesity and hypertension in adult men and women in Uzbekistan. The shape of the relationship between BMI and hypertension is different for women than for men. A lack of association with physical activity level and generally weak, inconsistent associations with diet, current smoking, and alcohol use may be partly because some men and women may have altered their behavior after becoming obese or after being diagnosed with hypertension. Prospective cohort studies are needed to better understand the relationships between physical activity, diet, smoking, and risks of obesity and hypertension.

KEY WORDS: overweight, obesity, BMI, nutrition, blood pressure, hypertension, Uzbekistan

## INTRODUCTION

Problems of overweight and obesity are caused by chronic imbalance between energy intake and actual energy needs of the body. Declining physical activity and increasing consumption of foods rich in saturated fat and sugar are primary reasons for a growing obesity epidemic worldwide (WHO 2003). Once considered a problem related to affluence, obesity is now fast growing in many developing countries (Monteiro et al. 2004; WHO 2003) and the burden of obesity within countries is shifting towards groups with lower socioeconomic status (Monteiro et al. 2004).

A recent analysis of anthropometric measurements for women age 20–49 in 36 developing countries observed that the proportion overweight exceeded the proportion underweight in a majority of the countries in both urban and rural areas. In this study, the median ratio of overweight to underweight was 5.8 in urban areas and 2.1 in rural area (Mendez et al. 2005). These results are contrary to the general belief that in developing countries overweight is less prevalent than underweight and that it is primarily concentrated in urban, higher socioeconomic status households.

A number of factors have been identified as being related to obesity and many of these factors are also associated with adverse health outcomes. Consumption of high energy and high fat foods has been linked to the risk of obesity (e.g., Hu et al. 2002; Lin et al. 2004). Sedentary behavior (e.g., television viewing and use of motorized transportation) and physical inactivity have been associated with obesity and markers of cardiovascular disease risk (Jakes et al. 2003; Hu et al. 2004; Hu et al. 2002; Sobngwi et al. 2002; Gopinath et al. 1994; Lin et al. 2004; Nanchahal et al. 2005; Vioque et al. 2000; Bell et al. 2002). Tobacco smoking has been positively associated with the risk of hypertension (e.g., Niskanen et al. 2004; Okubo et al. 2004), but some studies have reported a negative association between smoking and obesity (e.g., Hu et al. 2002). Alcohol consumption has been found to be negatively associated with obesity and the risk of metabolic disorders (e.g., Djousse et al. 2004). With respect to background characteristics, being married has been positively associated with obesity (Jeffery and Rick 2002; Hu et al. 2002) and both educational attainment and economic status have been linked with obesity and the risk of coronary heart disease (Nanchahal et al. 2005; Monteiro et al. 2001).

A number of cross-sectional and prospective studies have reported strong associations between obesity and risks of hypertension, diabetes, and other cardiovascular diseases (e.g., Kotsis et al. 2005; Sanchez-Castillo et al. 2005; Liu et al. 2004; Hu et al. 2004; Niskanen et al. 2004; Szczygielska et al. 2003; Lee et al. 2004; Venkatramana and Reddy 2002; Misra et al. 2001; Gopinath et al. 1994; Nanchahal et al. 2005; Adair 2004; Lerman-Garber et al. 1999).

There has been limited previous research on the epidemiology and risk factors of obesity and associated markers for cardiovascular disease risk in Central Asian countries. From the few available studies, it is clear that the problems of obesity are common among adults in these countries (Popkin et al. 1997), and a recent study warns of an inevitable epidemic of hypertension in Central Asia (Young et al. 2005). An earlier large

population-based study in Kazakhstan noted a strong association between obesity, hypertension, and coronary heart disease (Kadyrova and Salkhanov 1990). Recent studies in Syrdarya Province and the Ferghana Valley in Uzbekistan have recorded high prevalence of central obesity and a strong association of obesity with glucose intolerance in adults (King et al. 2002; King et al. 1998).

In summary, the growing obesity pandemic in the developing world is associated with a host of other rapidly growing serious health problems, such as hypertension, diabetes, and heart disease. In many developing countries, cardiovascular diseases are already a major cause of ill health and death. In Uzbekistan, for example, cardiovascular diseases account for about two-thirds of all deaths (WHO 2005). While the relationships between obesity and hypertension and other cardiovascular diseases are well recognized, there is limited understanding of the scope of these problems, the relationships among different conditions, and the underlying behavioral risk factors in such developing-country settings. This is partly due to a preoccupation with widespread and persistent problems of undernutrition. Another limiting factor has been a lack of reliable data on the prevalence and distribution of obesity and associated chronic diseases in these populations.

A recent health examination survey in Uzbekistan measured levels of obesity and hypertension in a nationally-representative probability sample of adult men and women. The survey also collected information on health risk behaviors, including tobacco smoking, alcohol use, level of physical activity, and dietary habits, as well as sociodemographic characteristics. These data provide a unique opportunity to study the epidemiology of obesity and hypertension in different population groups in Uzbekistan and their associations with selected risk factors. These data also allow a close examination of the relationship between body weight and the risk of hypertension.

## DATA AND METHODS

### *Data*

The analysis is based on the 2002 Uzbekistan Health Examination Survey (UHES). The survey collected information from 4,168 sample households in 219 sample enumeration areas (101 in urban areas and 118 in rural areas). The sampling design for the survey was developed by the State Department of Statistics of the Ministry of Macroeconomics and Statistics. A weighted, multistage, cluster sampling design was used. The sample was designed to represent five major regions of Uzbekistan—Tashkent City and the Western, Central, East-Central, and Eastern Regions (see footnotes to Table 1 for a list of oblasts included in these regions). All women age 15–49 in the sample households were eligible for interview. All men age 15–59 in the selected households in Tashkent City were eligible respondents, but in the remaining four regions men age 15–59 were eligible to be interviewed in only every third household. Individual questionnaires were completed for 98% of eligible women and 95% of eligible men. Overall, interviews were completed with 5,463 women age 15–49 and 2,333 men age 15–59. More details on the sample design are provided in the main survey report (AIC, Ministry of Health et al. 2004).

The survey collected information on a wide range of adult health issues, including lifestyle factors such as physical activity, diet, smoking, and alcohol use, and other risk factors for cardiovascular disease. The survey also collected data on a number of key biomarkers, including measurements of height, weight, and blood pressure for all respondents, as well as measurements of lipids and diabetes for respondents in Tashkent City. The 2002 UHES provides data on these biomarkers and several social and behavioral risk factors representative of the general population, as opposed to clinic-based data.

*Measurements of obesity and hypertension*

All survey respondents were weighed using a solar-powered scale with an accuracy of ±100 grams. Their height was measured using an adjustable wooden measuring board, specifically designed to provide accurate measurements (to the nearest 0.1 cm) in a developing-country field situation. The weight and height data were used to calculate the body mass index (BMI). BMI was used to define underweight (BMI < 18.5 $kg/m^2$), normal (18.5 ≤ BMI < 25.0 $kg/m^2$), overweight (25.0 ≤ BMI < 30.0 $kg/m^2$), and obese (BMI ≥ 30 $kg/m^2$) adults.

Blood pressure measurements were taken by female and male interviewers who were nurses and doctors. Prior to the survey fieldwork, these interviewers were given refresher training in measurement procedures in nonclinical settings. Measurements were made using sphygmomanometers (Mercury safe, TRIMLINEm Mercurial Desk Sphygmomanometer) and stethoscopes according to the protocols of Westat Inc. (1993). Two measurements of systolic and diastolic blood pressure (measured in millimeters of mercury, mmHg) were taken at an interval of at least 10 minutes between measurements. Adults were classified as hypertensive if they were taking antihypertensive drugs, or if (according to the second blood pressure measurement) their systolic blood pressure was ≥ 130 mmHg or their diastolic blood pressure was ≥ 85 mmHg (Grundy et al. 2004; IDF 2005). The main survey report used 140 and 90 mmHg cutoffs for systolic and diastolic blood pressure to define hypertension (AIC, Ministry of Health et al. 2004).

*Risk factors and confounders*

The risk factors of obesity and hypertension included in the study are: physical activity level (expressed as MET-minutes per week, where METs are computed by weighting each type of physical activity by its energy requirements; METs are multiples of the resting metabolic rate), eight indicators of diet (frequency of eating animal source protein, carbohydrates, fresh fruits and vegetables, dried fruits and vegetables, canned or pickled fruits and vegetables, and fried foods, and whether salt or fat are added to cooked food), tobacco smoking, and alcohol consumption in the last 12 months. The background characteristics of the respondents that are included as potential confounders are: age, marital status, education, work status (employment in the last 12 months and occupation),

difficulty in making ends meet (economic status), ethnicity, religion, residence, and geographic region. For definitions of these variables, see Table 1.

*Analysis*

Data are analyzed using both descriptive and multivariate logistic regression methods. All analysis is done separately for adult men (age 15–59) and women (age 15–49). Women who were pregnant at the time of the survey and women who had a live birth or a stillbirth during the two months preceding the survey were excluded from the analysis. Results are presented in the form of odds ratios (OR) with significance levels and 95% confidence intervals (95% CI). The logistic regression models were estimated using the STATA statistical software package (Stata Corporation 2003). In the survey, certain states and certain categories of respondents were oversampled and nonresponse rates varied from one geographical area to another. In all analysis in this study, weights are used to restore the representativeness of the sample (AIC, Ministry of Health et al. 2004).

RESULTS

In Uzbekistan, women (15–49) are much less likely than men (15–59) to be physically active, smoke tobacco, or consume alcohol (Table 1). Women consume animal protein, carbohydrates, fresh fruits and vegetables, fried foods, and add fat to cooked food more frequently than men. Women are slightly less likely to have higher education and considerably less likely to be employed than men. About two-thirds of men and women were married at the time of UHES. Six percent of women were separated, divorced, or widowed compared with less than 2% of men. Sixty percent men and women live in rural areas, more than 85% are Uzbek, and more than 95% are Muslim.

<Table 1 about here>

Overall, 26% of men age 15–59 in Uzbekistan are overweight and 5% are obese; only 4% are underweight (not shown). Corresponding proportions for women age 15–49 are 21% overweight, 7% obese, and 6% underweight (Table 2). Notably, women are somewhat less likely to be overweight but more likely to be obese than men. A comparison of anthropometric data for Uzbekistan from the 1996 Demographic and Health Survey and the 2002 Health Examination Survey shows that the proportion overweight or obese among women (15–49) increased from 22% in 1996 to 28% in 2002. Seventeen percent of men age 15–59 and 12% of women age 15–49 in the 2002 UHES suffered from hypertension. These levels of hypertension are higher from those reported in the main survey report (8% for both men and women) due to the differences in the definition of hypertension (mentioned earlier).

<Table 2 about here>

Prevalence of overweight, obesity, and hypertension do not vary much by physical activity level, except that men with a high level of physical activity are less likely than other men to be overweight. Among the diet indicators, frequency of eating animal protein, carbohydrates, fresh fruits and vegetables, and adding fat to cooked food are positively associated with obesity in both men and women, but frequency of eating dried fruits and vegetables is positively associated with obesity only in men and adding salt to cooked food is positively associated with obesity only in women. Adding salt to cooked food and adding fat to cooked food are positively associated with hypertension in both men and women. The associations of other diet variables with obesity and hypertension are generally small and inconsistent. Tobacco smoking (especially in the past) and alcohol consumption are associated with higher levels of obesity and hypertension.

As expected, there is a strong positive association between age and the prevalence of obesity and hypertension in both men and women. For both men and women, the proportion overweight or obese rises from less than 8% at age 15–19 to more than 50% at age 45–49. The prevalence of hypertension similarly rises from less than 5% at age 15–19 to about 40% at age 45–49. Education and marital status are also strongly associated with the prevalence of obesity and hypertension, but there are no consistent patterns for other background factors. Prevalence levels of obesity and hypertension are much lower in the Eastern region than in other regions of Uzbekistan.

*Effects of physical activity, diet, and other factors on risk of overweight and obesity*

Table 3 shows that physical activity level has no significant effect on the risk of being overweight or obese in both men and women. This is unexpected and may partly be because some overweight adults may increase their level of physical activity in an attempt to lose weight.

The frequency of eating animal protein is significantly positively associated with the risk of obesity in both men and women. Independent of physical activity level and other factors, men eating animal protein four or more days per week, on average, are more than four times as likely to be obese as those eating animal protein less than two days per week (OR=4.21; 95% CI: 1.97–8.99), but this effect is much smaller for women (OR=1.73; 95% CI: 1.12–2.68). The results for most other diet variables are inconsistent. For example, contrary to expectation, eating fresh fruits and vegetables five or more days per week is positively associated with obesity in both men (OR=1.76; $p$=0.166) and women (OR=1.65; $p$=0.022). Eating dried fruits and vegetables three or more days per week is significantly positively associated with obesity in men (OR=2.09; $p$=0.044), but significantly negatively associated with obesity in women (OR=0.65; $p$=0.035). Similarly, adding salt to cooked food is significantly negatively associated with obesity in men (OR=0.49; $p$=0.049), but significantly positively associated with obesity in women (OR=1.67; $p$=0.009). Reasons for these inconsistent findings are not clear.

<Table 3 about here>

In men, tobacco smoking is positively associated with the risk of obesity, but this relationship is stronger for past smoking (OR=2.16; $p$=0.017) than for current smoking (OR=1.43; $p$=0.258) and it is statistically significant only for past smoking. It is possible that some men stopped smoking after discovering that they had a smoking-related health problem, say hypertension, which tends to be correlated with obesity (as we shall see later). The adjusted effect of alcohol consumption is small and not significant for both men and women.

Among the background factors, age is strongly positively associated with overweight and obesity in both men and women, as expected. Men in union are much more likely to be obese than never married men (OR=9.28; 95% CI: 3.18–27.14). Women in union are also more likely to be obese than never married women (OR=1.54), but this effect is much smaller and not significant statistically. Overall, women in union are significantly more likely to be overweight or obese than never married women (OR=1.37; $p$=0.062). Interestingly, separated, divorced, or widowed women are significantly more likely to be overweight or obese than never married women (OR=1.71; $p$=0.016), but this relationship is not observed for men (OR=0.67; $p$=0.484). Non-Uzbek men and women are significantly less likely to be obese than Uzbek men and women (OR=0.44 for men and OR=0.50 for women). Urban residence is positively associated with obesity in men (OR=1.88; $p$=0.044), but not in women. By geographic region, men and women living in the Eastern region are much less likely to be overweight and obese than those living in Tashkent City (OR=0.53 and 0.34 for overweight and obesity in men, and OR=0.71 and 0.35 for overweight and obesity in women, respectively). Adjusted effects of education, work status, and economic status are generally small and not significant statistically.

*Effects of overweight and obesity on the risk of hypertension*

Overall, the risk of hypertension is much greater in men than in women at every level of BMI (Figure 1). In men, the risk of hypertension remains relatively low and constant at BMI levels below 24 kg/m$^2$, but then it generally increases with BMI. This is consistent with the international cutoff of BMI ≥ 25 kg/m$^2$ recommended for defining overweight. However, for women the risk of hypertension has a more or less linear positive relationship with the BMI level. Unlike for men, there is no clear BMI cutoff point for women beyond which the risk of hypertension accelerates.

<Figure 1 about here>

Table 4 shows the unadjusted and adjusted effects of overweight and obesity on the risk of hypertension in alternative models, separately for men and women. Overweight men and women are more than twice as likely to suffer from hypertension as those with a normal BMI (OR=2.02; 95% CI: 1.50–2.72 for men and OR=2.41; 95% CI: 1.90–3.04 for women) (Model 1 for men and women). The relationship is much stronger for obesity. Obese men are more than six times (OR=6.55; 95% CI: 4.07–10.55) and obese women are more than seven times (OR=7.05; 95% CI: 5.35–9.28) as likely to suffer from hypertension as men and women with a normal BMI, respectively. On the other hand,

underweight men and women are significantly less likely to suffer from hypertension than those with a normal BMI (OR=0.39 for men and OR=0.56 for women).

<Table 4 about here>

Controlling for physical activity level, diet variables, tobacco smoking (only for men), and alcohol use in Model 2 makes little difference to the effects of overweight and obesity on the risk of hypertension in both men and women. When age and eight other background factors are additionally controlled in Model 3, the effects of overweight and obesity are reduced considerably, but they remain large and statistically significant. With all the risk factors and background factors statistically controlled, obese men and women remain about three times as likely to suffer from hypertension as men and women with a normal BMI (OR=3.01; 95% CI: 1.67–5.44 for men and OR=2.82; 95% CI: 2.05–3.86 for women). The adjusted effects of overweight on the risk of hypertension are also smaller than the unadjusted effects, but remain positive and statistically significant (OR=1.35 for men and OR=1.54 for women).

## DISCUSSION

Results confirm strong adverse effects of overweight and obesity on the risk of hypertension in adult men and women in Uzbekistan. Overweight men and women are more than twice as likely and obese men and women are more than six times as likely to suffer from hypertension as men and women with a normal BMI. Even with physical activity level, diet, tobacco smoking, alcohol use, and a number of other potentially confounding background factors controlled statistically, obese men and women in Uzbekistan are about three times as likely to suffer from hypertension as men and women with a normal BMI. The adjusted effects of overweight on hypertension are also reduced, but remain positive and statistically significant. This finding of a strong positive association between obesity and hypertension is consistent with an earlier study in Central Asia (Kadyrova and Salkhanov 1990) and numerous studies from other parts of the world (e.g., Kotsis et al. 2005; Sanchez-Castillo et al. 2005; Liu et al. 2004; Niskanen et al. 2004; Lee et al. 2004; Hu et al. 2004; Venkatramana and Reddy 2002; Adair 2004; Lerman-Garber et al. 1999).

Overall, the risk of hypertension is much greater in men than in women at any given level of BMI. For men, the risk of hypertension is strongly positively associated with BMI only at BMI levels above 25 $kg/m^2$, but for women a positive relationship is observed at all BMI levels. This indicates that using a BMI cutoff point of 25 $kg/m^2$ to define overweight is more appropriate for men than for women.

Our analysis of the risk factors of obesity and hypertension produced mixed results. The study finds no significant association between physical activity level and the risk of obesity or hypertension. Eating animal protein and tobacco smoking in the past are positively associated with obesity, but there are no consistent associations with other diet indicators or alcohol use. The lack of association of obesity and hypertension with

physical activity level and the generally weak, inconsistent associations with diet, current smoking, and alcohol use in this study are inconsistent with previous research (Jakes et al. 2003; Hu et al. 2004; Hu et al. 2002; Sobngwi et al. 2002; Lin et al. 2004; Nanchahal et al. 2005; Vioque et al. 2000; Bell et al. 2002; Niskanen et al. 2004; Okubo et al. 2004).

The study finds that the prevalence of obesity and prevalence of hypertension have strong positive associations with age in both men and women, as expected. Urban residence has a strong positive association with obesity in men, but not in women. Men in union are considerably more likely to be obese than never married men, independent of other factors. Women in union are also more likely to be overweight or obese, but the relationship is much stronger for men.

A major limitation of our analysis is the cross-sectional nature of the data. In the UHES, the prevalence of overweight, obesity, and hypertension, as well as the prevalence of various risk factors, were measured at the time of the survey. A lack of association of obesity and hypertension with physical activity level and generally weak, inconsistent associations with diet, current smoking, and alcohol use may be partly due to the fact that some men and women may have altered their physical activity patterns, changed their eating habits, or quit smoking after becoming obese or after being diagnosed with hypertension. Prospective cohort studies are needed to better understand the relationships between physical activity, diet, smoking, and risks of obesity and hypertension.

Another limitation is that we were not able to consider other measures of obesity, particularly abdominal obesity, which may be more relevant for linking obesity with the risk of hypertension. In Asian populations, abdominal or central obesity is more common than obesity defined by BMI, and health risks associated with overweight and obesity occur at lower levels of BMI than in North America or Europe (WHO, IASO, IOTF 2000).

Moreover, our study could not control directly for the extent of use of medical services in connection with obesity or hypertension, although the set of control variables used in the study includes several measures of socioeconomic status, which are typically correlated with access to and use of medical services.

In conclusion, this study provides important new information on the prevalence of obesity and hypertension in different population groups in Uzbekistan. The results show a strong positive effect of obesity on the risk of hypertension in both men and women. However, the shape of the relationship between BMI and hypertension is different for women than for men. Moreover, several other relationships are observed only for men or only for women.

The findings emphasize the need to strengthen policies and programs to contain the obesity epidemic and prevent associated ill health and mortality. Moreover, the notably different findings for men and women in some of the analyses suggest that programs related to obesity and hypertension need to be gender sensitive.

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Table 1. Sample distribution (%) of men age 15-59 and women age 15-49 by selected risk factors and background characteristics, Uzbekistan 2002

| Characteristic | Men | Women |
|---|---|---|
| **Risk Factors** | | |
| Physical activity level[1] | | |
| Low | 29.5 | 44.3 |
| Medium | 33.7 | 42.3 |
| High | 36.8 | 13.4 |
| Diet | | |
| Animal protein[2] (days/week) | | |
| <2 | 31.3 | 27.3 |
| 2-3 | 50.4 | 49.8 |
| 4+ | 18.3 | 22.9 |
| Carbohydrate[3] | | |
| Not every day | 52.1 | 43.0 |
| Every day | 47.9 | 57.0 |
| Fresh fruits and vegetables[4] (days/week) | | |
| <3 | 23.1 | 21.4 |
| 3-4 | 40.2 | 31.8 |
| 5+ | 36.7 | 46.8 |
| Dried fruits and vegetables[5] (days/week) | | |
| <1 | 27.2 | 30.1 |
| 1-2 | 45.5 | 40.8 |
| 3+ | 27.3 | 29.1 |
| Canned or pickled fruits and vegetables[6] | | |
| Does not eat | 59.8 | 60.8 |
| Eats, <2 days/week | 21.0 | 18.8 |
| Eats, 2+ days/week | 19.2 | 20.4 |
| Fried foods[7] (days/week) | | |
| <3 | 36.9 | 20.3 |
| 3-5 | 38.6 | 29.4 |
| 6+ | 24.5 | 50.3 |
| Adds salt to cooked food | | |
| No | 86.6 | 87.5 |
| Yes | 13.4 | 12.5 |
| Adds fat to cooked food | | |
| No | 94.1 | 82.4 |
| Yes | 6.0 | 17.6 |
| Tobacco smoking[8] | | |
| Never | 59.1 | 98.6 |
| Past only | 16.9 | 0.4 |
| Current | 24.1 | 1.0 |
| Alcohol consumption in last 12 months[9] | | |
| No | 33.6 | 74.8 |
| Yes-not a problem drinker | 50.6 | 24.4 |
| Yes-problem drinker | 15.7 | 0.8 |

| | | |
|---|---|---|
| **Background factors** | | |
| Age | | |
| 15-19 | 16.3 | 20.8 |
| 20-24 | 16.6 | 17.5 |
| 25-29 | 17.1 | 14.0 |
| 30-34 | 12.6 | 13.7 |
| 35-39 | 11.0 | 13.1 |
| 40-44 | 9.7 | 12.0 |
| 45-49 | 8.4 | 9.0 |
| 50-54 | 6.0 | - |
| 55-59 | 2.3 | - |
| Marital union | | |
| Never married | 29.7 | 27.6 |
| In union | 68.6 | 66.2 |
| Separated/divorced/ widowed | 1.7 | 6.2 |
| Education | | |
| Primary/middle | 8.0 | 10.6 |
| Secondary | 56.2 | 58.0 |
| Secondary special | 20.1 | 20.7 |
| Higher | 15.6 | 10.8 |
| Work status[10] | | |
| Not employed | 34.8 | 54.6 |
| White collar | 32.6 | 28.5 |
| Manual/agriculture | 32.6 | 16.9 |
| Making ends meet[11] | | |
| Great difficulty | 26.0 | 28.4 |
| Some difficulty | 36.2 | 34.6 |
| Little or no difficulty | 37.8 | 37.1 |
| Ethnicity | | |
| Uzbek | 86.2 | 85.2 |
| Other[12] | 13.8 | 14.8 |
| Religion | | |
| Muslim | 96.8 | 95.7 |
| Other[13] | 3.2 | 4.3 |
| Residence | | |
| Rural | 60.7 | 59.6 |
| Urban | 39.3 | 40.4 |
| Region[14] | | |
| Tashkent City | 8.5 | 9.5 |
| Western | 13.5 | 12.7 |
| Central | 21.8 | 24.2 |
| East-Central | 27.7 | 25.8 |
| Eastern | 28.5 | 27.8 |
| Number of cases[15] | 2333 | 5146 |

[1]Physical activity level is expressed as MET-minutes per week. METs are multiples of the resting metabolic rate. Using the International Physical Activity Questionnaire (IPAQ) guidelines (IPAQ 2004), a physical activity score is calculated for each person based on the information on total number of minutes per week spent walking (x3.3 METs), doing moderate physical activity (x4.0 METs), and vigorous physical activity (x8.0 METs). Persons with a physical activity score <6000 MET-minutes are defined as having a low level of physical activity; 6000-13999 as having a medium level of physical activity; and 14000+ as having a high level of physical activity.

[2]Animal protein intake is measured by an average score, which is calculated by adding number of days in the last week eating foods from each of the following four categories and dividing by four: 1. cheese, yoghurt, kefir, ice cream, milk, or other milk products; 2. eggs; 3. red meats; 4. fish and poultry.

[3]Carbohydrate intake is measured by an average score, which is calculated by adding number of days in the last week eating foods from each of the following three categories and dividing by three: 1. roots and tubers such as white potatoes, turnips, radishes, or beet root; 2. bread, rice, pasta, cereal, cookies, biscuits or similar products made with wheat or white flour; 3. sugary foods, confectionery, pastry, cakes, chocolates, or sweets.

[4]Fresh fruit and vegetable intake is measured by an average score, which is calculated by adding number of days in the last week eating foods from each of the following three categories and dividing by three: 1. dark green leafy vegetables or condiments such as parsley, dill, spinach, rahon, cilantro, basil, mint, lettuce or cabbage; 2. other fresh vegetables including vegetables in stews, soups, and salads; 3. fresh fruits.

[5]Dried fruit and vegetable intake is measured by an average score, which is calculated by adding number of days in the last week eating foods from each of the following three categories and dividing by three: 1. beans, peas, or legumes; 2. nuts or seeds; 3. dried fruits.

[6]Canned or pickled fruit and vegetable intake is measured by an average score, which is calculated by adding number of days in the last week eating foods from each of the following three categories and dividing by three: 1. foods prepared with tomato paste; 2. pickled or canned vegetables; 3. canned fruits.

[7]Number of days fried foods eaten in the last week.

[8]Tobacco smoking in past only includes persons who smoked fairly regularly in the past but do not currently smoke.

[9]Based on the Rapid Alcohol Problems Screen (RAPS) guidelines (Cherpitel 1997), a person who consumed alcohol in the past 12 months is defined as a problem drinker or alcohol dependent if he/she answered "yes" to any of the following questions: 1. Do you sometimes take a drink in the morning when you first get up? 2. During the past year, has a friend or family member ever told you about things you said or did while you were drinking that you could not remember? 3. During the past year, have you failed to do what was normally expected of you because of drinking? 4. During the past year, have you lost friends because of your drinking? A fifth screening question on feeling of guilt or remorse after drinking was not included due to problems of interpretation in the Uzbekistan context.

[10]White collar includes professional, technical, managerial, clerical, or sales and services; manual/agriculture includes skilled manual, unskilled manual, or agriculture.

[11]Making ends meet denotes economic hardship for the household in which the person lives. Little or no difficulty category includes households mentioning a little difficulty, fairly easily, easily, or very easily in response to the question on ability to make ends meet.

[12]Other ethnic groups include Russian, Karakalpak, Tajik, and others.

[13]Other religions include Christian, no religion, and others.

[14]Western region includes the Autonomous Republic of Karakalpakstan and Khorezm Oblast; Central region includes Navoi, Bukhara, Kashkadarya, and Surkhandarya Oblasts; East-Central region includes Samarkhand, Jizzakh, Syrdarya, and Tashkent Oblasts; Eastern region includes Namangan, Ferghana, and Andizhan Oblasts.

[15]Actual number of cases for individual variables varies slightly depending on the number of missing cases.

Table 2. Prevalence of overweight, obesity, and hypertension[a] by selected risk factors and background characteristics, by sex, Uzbekistan 2002

| Characteristic | Men | | | Women | | |
|---|---|---|---|---|---|---|
| | Over-weight | Obese | Hyper-tensive | Over-weight | Obese | Hyper-tensive |
| **Risk Factors** | | | | | | |
| Physical activity level | | | | | | |
| Low | 29.1 | 5.6 | 16.3 | 20.3 | 6.9 | 12.1 |
| Medium | 27.5 | 5.1 | 18.2 | 21.6 | 6.8 | 11.3 |
| High | 23.2 | 5.2 | 16.1 | 18.7 | 8.2 | 14.7 |
| Diet | | | | | | |
| Animal protein (days/week) | | | | | | |
| <2 | 24.5 | 2.5 | 14.6 | 20.3 | 6.5 | 13.6 |
| 2-3 | 25.7 | 5.1 | 17.3 | 20.8 | 6.5 | 11.3 |
| 4+ | 31.6 | 10.6 | 19.6 | 20.9 | 8.9 | 12.1 |
| Carbohydrate | | | | | | |
| Not every day | 28.9 | 4.0 | 15.9 | 19.7 | 6.3 | 13.1 |
| Every day | 23.7 | 6.7 | 17.9 | 21.4 | 7.6 | 11.4 |
| Fresh fruits and vegetables (days/week) | | | | | | |
| <3 | 27.7 | 3.0 | 16.5 | 19.4 | 5.9 | 13.9 |
| 3-4 | 27.4 | 3.8 | 15.6 | 19.9 | 5.7 | 11.2 |
| 5+ | 24.5 | 8.4 | 18.5 | 21.8 | 8.5 | 11.9 |
| Dried fruits and vegetables (days/week) | | | | | | |
| <1 | 23.7 | 4.4 | 19.4 | 21.2 | 8.2 | 11.3 |
| 1-2 | 26.8 | 4.7 | 16.5 | 21.1 | 6.4 | 12.4 |
| 3+ | 28.4 | 7.3 | 15.0 | 19.6 | 6.9 | 12.6 |
| Canned or pickled fruits and vegetables | | | | | | |
| Does not eat | 26.6 | 5.4 | 17.6 | 20.6 | 7.5 | 12.4 |
| Eats, <2 days/week | 27.4 | 6.4 | 16.1 | 20.2 | 7.9 | 11.2 |
| Eats, 2+ days/week | 24.1 | 3.8 | 15.7 | 21.2 | 5.0 | 12.3 |
| Fried foods (days/week) | | | | | | |
| <3 | 26.4 | 5.6 | 18.4 | 22.8 | 7.0 | 16.0 |
| 3-5 | 30.9 | 5.7 | 15.7 | 19.7 | 7.8 | 13.0 |
| 6+ | 19.4 | 4.2 | 16.4 | 20.3 | 6.6 | 10.1 |
| Adds salt to cooked food | | | | | | |
| No | 25.7 | 5.3 | 16.3 | 20.5 | 6.4 | 11.6 |
| Yes | 30.7 | 5.5 | 20.7 | 22.3 | 11.6 | 16.2 |
| Adds fat to cooked food | | | | | | |
| No | 26.6 | 5.1 | 16.7 | 20.6 | 6.7 | 11.6 |
| Yes | 22.8 | 8.8 | 19.2 | 21.2 | 8.5 | 14.4 |
| Tobacco smoking | | | | | | |
| Never | 24.7 | 3.0 | 13.9 | NI | NI | NI |
| Past only | 29.7 | 10.2 | 24.3 | NI | NI | NI |
| Current | 28.3 | 7.4 | 19.0 | NI | NI | NI |
| Alcohol consumption in last 12 months | | | | | | |
| No | 22.6 | 2.7 | 12.5 | 20.5 | 6.2 | 11.4 |
| Yes-not a problem drinker | 28.8 | 6.0 | 18.3 | 21.3[b] | 9.5[b] | 14.4[b] |
| Yes-problem drinker | 26.6 | 8.5 | 21.6 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Background factors** | | | | | | |
| Age | | | | | | |
| 15-19 | 6.3 | 0.4 | 4.4 | 7.5 | 0.3 | 3.0 |
| 20-24 | 16.0 | 0.7 | 9.7 | 13.0 | 1.7 | 3.6 |
| 25-29 | 22.2 | 2.0 | 11.0 | 18.1 | 3.5 | 5.8 |
| 30-34 | 29.8 | 3.0 | 13.9 | 24.2 | 5.6 | 8.1 |
| 35-39 | 36.3 | 8.1 | 14.9 | 29.1 | 9.4 | 16.9 |
| 40-44 | 43.2 | 9.0 | 28.3 | 36.4 | 17.6 | 26.7 |
| 45-49 | 44.6 | 14.3 | 37.0 | 31.2 | 23.0 | 39.0 |
| 50-54 | 34.4 | 16.9 | 41.4 | - | - | - |
| 55-59 | 50.7 | 17.5 | 40.9 | - | - | - |
| Marital union | | | | | | |
| Never married | 10.6 | 0.3 | 7.0 | 8.9 | 0.9 | 3.8 |
| In union | 33.3 | 7.5 | 20.9 | 24.5 | 9.3 | 14.8 |
| Separated/divorced/ widowed | 24.1 | 1.7 | 26.6 | 31.9 | 10.6 | 20.8 |
| Education | | | | | | |
| Primary/middle | 17.9 | 1.8 | 13.4 | 15.8 | 8.5 | 11.8 |
| Secondary | 24.1 | 4.3 | 14.6 | 20.2 | 6.1 | 11.8 |
| Secondary special | 25.3 | 6.7 | 18.0 | 21.7 | 7.9 | 11.2 |
| Higher | 40.8 | 8.8 | 25.2 | 26.5 | 9.3 | 15.7 |
| Work status | | | | | | |
| Not employed | 20.7 | 1.9 | 14.7 | 17.9 | 5.7 | 10.5 |
| White collar | 34.7 | 8.0 | 19.6 | 25.5 | 9.1 | 13.6 |
| Manual/agriculture | 24.2 | 6.3 | 16.5 | 21.8 | 8.1 | 14.8 |
| Making ends meet | | | | | | |
| Great difficulty | 23.1 | 4.7 | 18.2 | 20.1 | 8.0 | 14.2 |
| Some difficulty | 28.8 | 4.4 | 16.1 | 22.0 | 6.0 | 11.1 |
| Little or no difficulty | 26.3 | 6.5 | 16.7 | 20.0 | 7.3 | 11.3 |
| Ethnicity | | | | | | |
| Uzbek | 26.7 | 5.5 | 15.8 | 21.1 | 7.2 | 12.1 |
| Other | 24.2 | 4.3 | 23.3 | 18.5 | 6.2 | 12.3 |
| Religion | | | | | | |
| Muslim | 26.4 | 5.4 | 16.6 | 20.7 | 7.0 | 12.0 |
| Other | 26.8 | 1.6 | 23.8 | 20.2 | 7.0 | 13.8 |
| Residence | | | | | | |
| Rural | 26.1 | 4.5 | 15.3 | 20.2 | 6.6 | 12.7 |
| Urban | 26.8 | 6.6 | 19.3 | 21.4 | 7.8 | 11.2 |
| Region | | | | | | |
| Tashkent City | 29.5 | 5.9 | 26.2 | 24.7 | 9.6 | 6.3 |
| Western | 19.0 | 7.3 | 27.3 | 17.9 | 9.7 | 17.0 |
| Central | 29.5 | 6.1 | 16.6 | 20.7 | 8.1 | 15.3 |
| East-Central | 31.1 | 6.6 | 15.6 | 21.3 | 7.9 | 13.4 |
| Eastern | 22.1 | 2.3 | 10.6 | 20.0 | 3.3 | 7.9 |
| Total | 26.4 | 5.3 | 16.9 | 20.7 | 7.0 | 12.1 |
| Number of cases | 604 | 121 | 393 | 1053 | 359 | 623 |

Note: For variable definitions, see Table 1.

[a]Hypertension is defined as either having systolic blood pressure ≥ 130 mmHg, diastolic blood pressure ≥ 85 mmHg, or taking blood pressure medication.

[b]Category includes all alcohol consumers in the last 12 months.

NI: Not included due to small numbers of female smokers in the sample.

Table 3. Adjusted effects (odds ratios) of selected risk factors on the risk of overweight and obesity, by sex, Uzbekistan 2002

| Characteristic | Men | | | Women | | |
|---|---|---|---|---|---|---|
| | Over-weight | Obese | Overweight or obese | Over-weight | Obese | Overweight or obese |
| **Risk Factors** | | | | | | |
| Physical activity level | | | | | | |
| Low‡ | - | - | - | - | - | - |
| Medium | 1.03 | 1.11 | 1.03 | 0.97 | 0.90 | 0.94 |
| High | 0.82 | 0.98 | 0.83 | 0.84 | 1.09 | 0.89 |
| Diet | | | | | | |
| Animal protein (days/week) | | | | | | |
| <2‡ | - | - | - | - | - | - |
| 2-3 | 1.14 | 2.30 * | 1.22 | 1.14 | 1.17 | 1.15 |
| 4+ | 1.56 † | 4.21 *** | 1.78 ** | 1.20 | 1.73 * | 1.30 * |
| Carbohydrate | | | | | | |
| Not every day‡ | - | - | - | - | - | - |
| Every day | 0.75 † | 0.77 | 0.76 † | 1.11 | 0.93 | 1.06 |
| Fresh fruits and vegetables (days/week) | | | | | | |
| <3‡ | - | - | - | - | - | - |
| 3-4 | 0.83 | 0.86 | 0.84 | 1.01 | 1.09 | 1.03 |
| 5+ | 0.64 * | 1.76 | 0.74 | 1.05 | 1.65 * | 1.16 |
| Dried fruits and vegetables (days/week) | | | | | | |
| <1‡ | - | - | - | - | - | - |
| 1-2 | 1.26 | 1.28 | 1.28 | 0.97 | 0.77 | 0.93 |
| 3+ | 1.63 * | 2.09 * | 1.71 ** | 0.85 | 0.66 * | 0.81 † |
| Canned or pickled fruits and vegetables | | | | | | |
| Does not eat‡ | - | - | - | - | - | - |
| Eats, <2 days/week | 0.94 | 1.10 | 0.97 | 1.03 | 1.16 | 1.06 |
| Eats, 2+ days/week | 0.82 | 0.54 | 0.77 | 1.06 | 0.99 | 1.04 |
| Fried foods (days/week) | | | | | | |
| <3‡ | - | - | - | - | - | - |
| 3-5 | 1.42 * | 0.95 | 1.34 † | 0.72 * | 1.02 | 0.79 * |
| 6+ | 0.77 | 0.54 | 0.73 | 0.75 * | 1.15 | 0.83 |
| Adds salt to cooked food | | | | | | |
| No‡ | - | - | - | - | - | - |
| Yes | 0.96 | 0.49 * | 0.88 | 1.22 | 1.67 ** | 1.33 * |
| Adds fat to cooked food | | | | | | |
| No‡ | - | - | - | - | - | - |
| Yes | 0.67 | 1.02 | 0.75 | 0.96 | 0.97 | 0.97 |
| Tobacco smoking | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Never‡ | - | - | - | NI | NI | NI |
| Past only | 0.88 | 2.16 * | 1.02 | NI | NI | NI |
| Current | 0.84 | 1.43 | 0.91 | NI | NI | NI |
| Alcohol consumption in last 12 months | | | | | | |
| No‡ | - | - | - | - | - | - |
| Yes-not a problem drinker | 0.78 | 1.03 | 0.79 | 0.93[a] | 1.05[a] | 0.97[a] |
| Yes-problem drinker | 0.70 | 1.31 | 0.77 | | | |
| **Background factors** | | | | | | |
| Age | | | | | | |
| 15-19‡ | - | - | - | - | - | - |
| 20-24 | 3.08 ** | 0.35 | 2.72 ** | 1.42 | 4.14 * | 1.55 * |
| 25-29 | 4.45 *** | 0.60 | 3.89 *** | 1.97 ** | 7.98 *** | 2.24 *** |
| 30-34 | 7.61 *** | 0.71 | 6.33 *** | 2.81 *** | 14.04 *** | 3.33 *** |
| 35-39 | 11.01 *** | 2.64 | 10.28 *** | 3.82 *** | 27.96 *** | 4.89 *** |
| 40-44 | 15.68 *** | 3.65 | 14.89 *** | 6.62 *** | 76.40 *** | 9.57 *** |
| 45-49 | 14.80 *** | 5.29 * | 15.22 *** | 5.52 *** | 94.82 *** | 9.30 *** |
| 50-54 | 10.12 *** | 7.26 * | 12.36 *** | - | - | - |
| 55-59 | 27.20 *** | 12.95 ** | 29.17 *** | - | - | - |
| Marital union | | | | | | |
| Never married‡ | - | - | - | - | - | - |
| In union | 1.39 | 9.28 *** | 1.50 | 1.33 | 1.54 | 1.37 † |
| Separated/divorced/ widowed | 0.73 | 0.73 | 0.67 | 1.77 * | 1.60 | 1.71 * |
| Education | | | | | | |
| Primary/middle‡ | - | - | - | - | - | - |
| Secondary | 1.16 | 2.28 | 1.23 | 1.07 | 0.69 | 0.95 |
| Secondary special | 1.21 | 2.66 | 1.31 | 1.06 | 0.72 | 0.95 |
| Higher | 1.55 | 2.37 | 1.57 | 1.05 | 0.58 † | 0.89 |
| Work status | | | | | | |
| Not employed‡ | - | - | - | - | - | - |
| White collar | 0.95 | 1.41 | 0.99 | 1.14 | 1.05 | 1.12 |
| Manual/agriculture | 0.70 † | 1.64 | 0.79 | 0.95 | 0.85 | 0.93 |
| Making ends meet | | | | | | |
| Great difficulty‡ | - | - | - | - | - | - |
| Some difficulty | 1.29 | 0.89 | 1.21 | 1.12 | 0.75 † | 1.03 |
| Little or no difficulty | 1.18 | 1.14 | 1.16 | 1.02 | 0.96 | 1.00 |
| Ethnicity | | | | | | |
| Uzbek‡ | - | - | - | - | - | - |
| Other | 0.91 | 0.44 † | 0.82 | 0.71 * | 0.50 ** | 0.65 *** |
| Religion | | | | | | |
| Muslim‡ | - | - | - | - | - | - |
| Other | 1.00 | 0.35 | 0.90 | 0.82 | 0.87 | 0.83 |
| Residence | | | | | | |
| Rural‡ | - | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| Urban | 1.06 | 1.88 * | 1.15 | 0.88 | 0.89 | 0.88 |
| Region | | | | | | |
| Tashkent City‡ | - | - | - | - | - | - |
| Western | 0.72 | 1.65 | 0.83 | 0.75 | 1.66 † | 0.92 |
| Central | 1.16 | 0.68 | 1.08 | 0.75 | 0.97 | 0.80 |
| East-Central | 1.04 | 0.89 | 1.02 | 0.82 | 1.01 | 0.85 |
| Eastern | 0.53 ** | 0.34 * | 0.51 ** | 0.71 * | 0.35 *** | 0.62 ** |
| Number of cases | 2152 | | 2152 | 4750 | | 4750 |

Note: For variable definitions, see Table 1

‡Reference category

†$p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

[a]Category includes all alcohol consumers in the last 12 months

NI: Not included due to small numbers of female smokers in the sample.

Table 4. Unadjusted and adjusted effects (odds ratios) of overweight and obesity and selected risk factors on the risk of hypertension, by sex, Uzbekistan 2002

| | Men | | | Women | | |
|---|---|---|---|---|---|---|
| Characteristic | Model 1 | Model 2 | Model 3 | Model 1 | Model 2 | Model 3 |
| **Risk Factors** | | | | | | |
| BMI (kg/m$^2$) | | | | | | |
| <18.5 | 0.39 * | 0.41 * | 0.53 | 0.56 † | 0.57 † | 0.89 |
| 18.5-24.9‡ | - | - | - | - | - | - |
| 25.0-29.9 | 2.02 *** | 2.03 *** | 1.35 † | 2.41 *** | 2.44 *** | 1.54 *** |
| 30.0+ | 6.55 *** | 5.77 *** | 3.01 *** | 7.05 *** | 7.18 *** | 2.82 *** |
| Physical activity level | | | | | | |
| Low‡ | | - | - | | - | - |
| Medium | | 1.14 | 1.26 | | 0.88 | 0.89 |
| High | | 0.94 | 1.06 | | 1.10 | 1.06 |
| Diet | | | | | | |
| Animal protein (days/week) | | | | | | |
| <2‡ | | - | - | | - | - |
| 2-3 | | 1.23 | 1.26 | | 0.86 | 1.01 |
| 4+ | | 1.30 | 1.30 | | 0.86 | 1.09 |
| Carbohydrate | | | | | | |
| Not every day‡ | | - | - | | - | - |
| Every day | | 1.07 | 0.92 | | 0.85 | 0.79 † |
| Fresh fruits and vegetables (days/week) | | | | | | |
| <3‡ | | - | - | | - | - |
| 3-4 | | 0.93 | 0.91 | | 0.79 † | 0.87 |
| 5+ | | 1.01 | 0.98 | | 0.83 | 0.99 |
| Dried fruits and vegetables (days/week) | | | | | | |
| <1‡ | | - | - | | - | - |
| 1-2 | | 0.83 | 0.98 | | 1.29 * | 1.25 |
| 3+ | | 0.63 * | 0.85 | | 1.36 * | 1.22 |

| | | | | |
|---|---|---|---|---|
| Canned or pickled fruits and vegetables | | | | |
| Does not eat‡ | - | - | - | - |
| Eats, <2 days/week | 0.89 | 0.88 | 0.85 | 0.92 |
| Eats, 2+ days/week | 0.89 | 0.82 | 1.03 | 1.23 |
| Fried foods (days/week) | | | | |
| <3‡ | - | - | - | - |
| 3-5 | 0.82 | 0.85 | 0.81 | 0.84 |
| 6+ | 1.02 | 1.22 | 0.64 *** | 0.81 |
| Adds salt to cooked food | | | | |
| No‡ | - | - | - | - |
| Yes | 1.18 | 0.93 | 1.10 | 1.06 |
| Adds fat to cooked food | | | | |
| No‡ | - | - | - | - |
| Yes | 1.12 | 1.05 | 1.24 | 1.12 |
| Tobacco smoking | | | | |
| Never‡ | - | - | NI | NI |
| Past only | 1.51 * | 1.36 | NI | NI |
| Current | 1.13 | 1.00 | NI | NI |
| Alcohol consumption in last 12 months | | | | |
| No‡ | - | - | - | - |
| Yes-not a problem drinker | 1.30 | 1.02 | 1.21[a] | 1.04[a] |
| Yes-problem drinker | 1.46 † | 1.11 | | |
| **Background factors** | | | | |
| Age | | | | |
| 15-19‡ | | - | | - |
| 20-24 | | 2.61 ** | | 1.11 |
| 25-29 | | 2.94 ** | | 1.95 * |
| 30-34 | | 3.37 ** | | 2.60 ** |
| 35-39 | | 3.51 ** | | 5.60 *** |
| 40-44 | | 8.46 *** | | 9.21 *** |
| 45-49 | | 12.46 *** | | 17.11 *** |

| | | |
|---|---|---|
| 50-54 | 13.68 *** | - |
| 55-59 | 12.60 *** | - |
| Marital union | | |
| Never married‡ | - | - |
| In union | 1.14 | 0.96 |
| Separated/divorced/ widowed | 1.42 | 1.37 |
| Education | | |
| Primary/middle‡ | - | - |
| Secondary | 1.05 | 1.08 |
| Secondary special | 1.13 | 0.96 |
| Higher | 1.36 | 1.24 |
| Work status | | |
| Not employed‡ | - | - |
| White collar | 0.59 * | 0.90 |
| Manual/agriculture | 0.65 * | 0.92 |
| Making ends meet | | |
| Great difficulty‡ | - | - |
| Some difficulty | 0.92 | 0.85 |
| Little or no difficulty | 1.02 | 0.92 |
| Ethnicity | | |
| Uzbek‡ | - | - |
| Other | 1.12 | 0.86 |
| Religion | | |
| Muslim‡ | - | - |
| Other | 1.01 | 1.12 |
| Residence | | |
| Rural‡ | - | - |
| Urban | 0.98 | 0.83 |
| Region | | |
| Tashkent City‡ | - | - |
| Western | 1.09 | 4.00 *** |
| Central | 0.47 * | 2.77 *** |

| | | | | | | |
|---|---|---|---|---|---|---|
| East-Central | | | 0.44 ** | | | 2.62 *** |
| Eastern | | | 0.30 *** | | | 1.39 |
| Number of cases | 2256 | 2250 | 2248 | 5080 | 5069 | 5058 |

Note: For variable definitions, see Table 1

‡Reference category

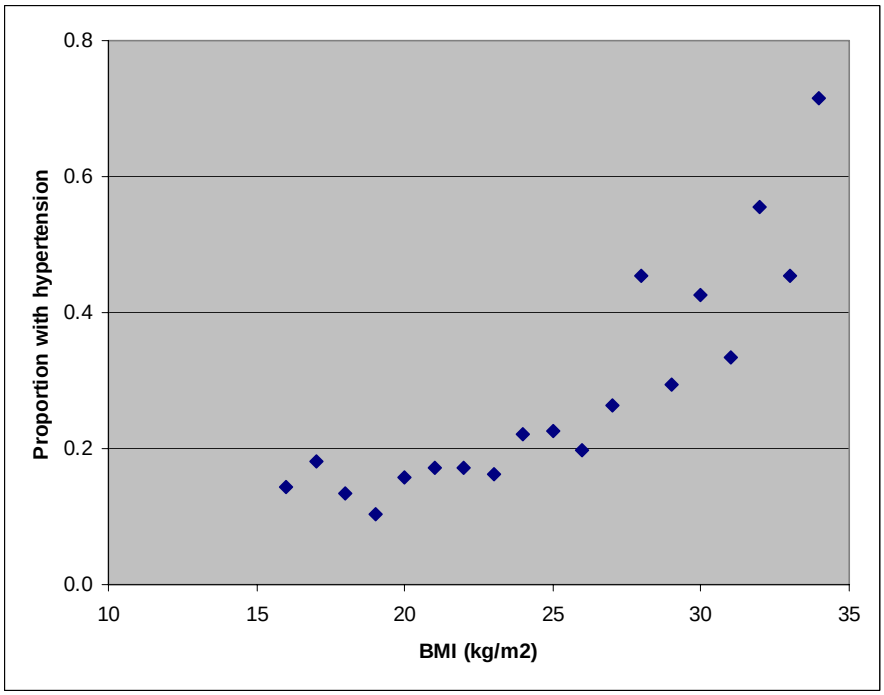
†$p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

[a]Category includes all alcohol consumers in the last 12 months

NI: Not included due to small numbers of female smokers in the sample.

Figure 1. Association between BMI and hypertension, Uzbekistan 2002

MEN




WOMEN