among middle-aged males throughout Europe[4,5] and also in Kazakhstan.[6] In 2005, more than 30.0% of Kazakh people who died from CVD were of working age (20–65 years), and almost 70.0% were males.[6] In reality, the major causes of CVD are known, and if these risk factors (RFs) were eliminated, at least 80.0% of all CVDs could be prevented.[1,4]

Kazakhstan has implemented policies aimed at healthy lifestyle promotion over the past 10 years, and the 2007 national sociological study[7] showed a reduction in alcohol consumption compared to 1998 (35.6% versus 55.0%) along with a stabilization of the indicators of smoking (27.0% versus 28.0%). Knowledge of, and the ability to identify RFs, are essential components of behavior change and the decline of CVD.[2,8-13] The socioeconomic situation of a nation is also an important factor in the development and reduction of CVD as a whole, and at individual level. Until recently, CVD-related RFs and the diseases linked to them were more commonly associated with developed countries, but now they are becoming more prevalent in developing nations.[1,4] Several studies have revealed that the prevalence of CVD may rise with the increasing wealth of a population, and that previously, higher CVD prevalence had been associated with higher social status. In the majority of wealthy countries today, the higher CVD prevalence is associated with lower social classes because higher social classes are more likely to follow the recommendations for CVD prevention.[5]

Almost 50.0% of the Kazakh population live in rural areas. Although socioeconomic status (SES) is a significant independent variable of CVD RF development, its importance has yet to be fully clarified in our country. Many studies have documented strong associations between socioeconomic variables (education, occupation, income and marital status) and CVD development in countries with a various SESs[2,3,14-28] and also among rural or working age populations.[3,12,13,19,21] Only a few studies have explored this issue in countries with an economy in transition like former Soviet Union countries, such as Kazakhstan. Assessment and monitoring of the prevalence of CVD RFs and knowledge about them are essential for the initial development and implementation of targeted measures among population groups, particularly to reduce CVD-related mortality and morbidity of high-risk subjects, and to promote a healthy lifestyle. So far, there has been a great paucity of information concerning CVD RFs in Kazakhstan. Therefore, the objectives of the present work were to estimate CVD RF prevalence and the level of knowledge a rural working age population of Kazakhstan had to identify those CVD RFs, while taking into account socioeconomic characteristics.

MATERIALS AND METHODS

This cross-sectional study was conducted from April to July 2008. Data were collected from the primary health care (PHC) organizations of 26 rural villages of two districts of the West Kazakhstan region. A list of 10,642 eligible people 25–65 years old was obtained from the PHCs covering those 26 rural villages. Through systematic random sampling, we chose every 16th person from the list to achieve our desired 650 subjects for data collection. Because of their reluctance to be interviewed, absence from home, or illness during data collection, we could not interview some of the respondents. Some subjects with incomplete information were also excluded from the analysis. Finally, we obtained complete data from 611 (304 men and 307 women) with a response rate of 94%. The study group was a working age population (25–65 years), divided into 4 age groups (25–34, 35–44, 45–54 and 55–65). The survey, using a self-administered questionnaire, was conducted by nurses of PHC organizations situated in the localities of the study. During the first home visit, all data were collected with the questionnaire, except for anthropometric data. In the next two weeks, respondents were asked to come to the PHC organization for the

measurement of anthropometric data: height (cm), body weight (kg), waist circumference (cm), and thigh circumference (cm). Assessment of the studied RFs was conducted according to the standards recommended by the World Health Organization. Body mass index (BMI) was evaluated as normal (18.5–24.9 kg/m²) and overweight (≥25.0 kg/m²). Systolic blood pressure (SBP) ≥140 mm Hg and diastolic blood pressure (DBP) ≥90 mm Hg were defined as 'hypertension'.

In order to assess knowledge about CVD RFs, 10 different answers had been prepared. Each correct answer was scored as 1, and each wrong answer was scored as 0. A total score of 75.0% or more was treated as good knowledge and a total score less than 75.0% was treated as poor knowledge.[29] The study protocol was approved by the ethical committee (Academic Board) of the National Center of Healthy Lifestyle Formation of Ministry Health care, and also by the local ethics committee of the Western Kazakhstan Health Care Department. Moreover, all respondents gave their voluntary consent to participate in the study.

Statistical analysis

We used numbers and percentages to obtain all demographic and socioeconomic characteristics of respondents, and the chi-square test was used to compare differences in CVD RF-related knowledge by socioeconomic variables. To verify associations of CVD RFs with socioeconomic factors and knowledge, a logistic regression model was applied. A p value of <0.05 was considered significant. The Statistical Package for Social Science (SPSS) for Windows software (SPSS Inc., version 15, Chicago, USA) was used to analyze data.

RESULTS

Socio-economic characteristics of the respondents

Socioeconomic characteristics of the respondents are presented in Table 1. The average age of the respondents was 43.2 years, and a majority of them were from the Kazakh community (76.6%). The gender distribution was 49.8% male and 50.2% female, and overall, females were more educated than males. With regard to employment status, 39.8% of males were blue-collar workers engaged in hard physical labor. Female employees were white-collar workers usually engaged in sedentary activities with local government or private companies. However, 38.3% of the respondents were unemployed. Consequently, monthly income per family was not so high; almost three-quarters of the respondents had a family income of less the 36,000 tenge ($300) per month.

Knowledge of CVD RFs

Table 2 summarizes the percentage of the study population who could identify the RFs for CVD. More than half of the respondents could identify tobacco smoking (60.4%), alcohol drinking (64.8%), overweight (72.5%), and hypertension (49.9%) as RFs for CVD. While the ability to identify these RFs was higher among university-educated respondents, it was also satisfactorily identified by the less educated population.

As explained in Table 3, we found that only about a quarter of the respondents had a good level of knowledge and females were more knowledgeable than males (p=0.038). With regard to the education level, 43.8% of subjects with a university degree had significantly better knowledge than others (p<0.001). Employed subjects and higher income subjects also were likely to be more knowledgeable than the other groups (p=0.023 and p=0.022, respectively).

Table 1 Socioeconomic characteristics of respondents

	Male	Female	Total
	Number (%)	Number (%)	Number (%)
Total	304 (49.8)	307 (50.2)	611 (100.0)
Age group (years)			
25–34	69 (22.7)	73 (23.8)	142 (23.2)
35–44	81 (26.6)	72 (23.5)	153 (25.0)
45–54	90 (29.6)	91 (29.6)	181 (29.6)
55–65	64 (21.1)	71 (23.1)	135 (22.1)
Age (mean ± SD)	43.0±11.4	43.3±11.5	43.2±11.5
Marital status			
Married	251 (82.6)	231 (75.2)	482 (78.9)
Widow/divorced	9 (3.0)	42 (13.7)	51 (8.3)
Unmarried	44 (14.4)	34 (11.1)	78 (12.8)
Education level			
Below secondary	33 (10.9)	23 (7.5)	56 (9.2)
Secondary	136 (44.7)	134 (43.6)	270 (44.2)
College	100 (32.9)	105 (34.2)	205 (33.6)
University	35 (11.5)	45 (14.7)	80 (13.1)
Professional group			
Worker[a]	121 (39.8)	43 (14.0)	164 (26.8)
Employee	74 (24.3)	139 (45.3)	213 (34.9)
Unemployed	109 (35.9)	125 (40.7)	234 (38.3)
Nationality			
Kazakh	234 (77.0)	234 (76.2)	468 (76.6)
Russian	54 (17.8)	57 (18.6)	111 (18.2)
Minority	16 (5.3)	16 (5.2)	32 (5.2)
Monthly family income[b] (tenge)			
<36,000	235 (77.3)	207 (67.4)	442 (72.3)
≥36,000	69 (22.7)	100 (32.6)	169 (27.7)

[a]Worker means 'blue-collar workers' engaged in hard physical labor, [b]1USD=120 tenge

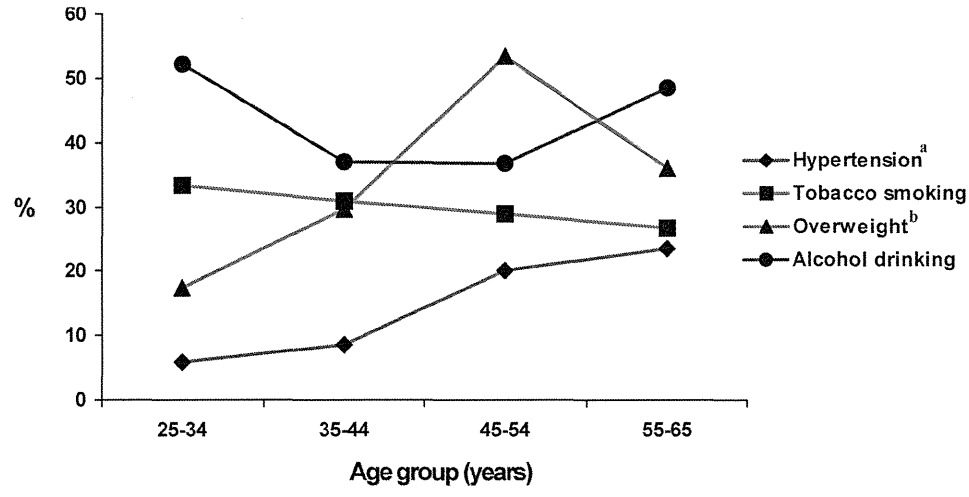

Fig. 1 Distributions of cardiovascular disease risk factors among males by age group. [a]Hypertension was defined as systolic blood pressure ≥140 mm of Hg and diastolic blood pressure ≥ 90mm of Hg. [b]Overweight was defined as body mass index ≥25 kg/m^2, which also included obesity

Table 2 Percentage of study subjects who identified risk factors for cardiovascular diseases by socioeconomic characteristics

	Risk factors			
	Tobacco smoking	Overweight[a]	Alcohol drinking	Hypertension[b]
	Number (%)	Number (%)	Number (%)	Number (%)
Total	369 (60.4)	443 (72.5)	396 (64.8)	305 (49.9)
Age group (years)				
25–34	92 (64.8)	104 (73.2)	99 (69.7)	72 (50.7)
35–44	105 (68.6)	117 (76.5)	97 (63.4)	82 (53.8)
45–54	97 (53.6)	130 (71.8)	116 (64.1)	92 (50.8)
55–65	75 (55.6)	92 (68.1)	84 (62.2)	59 (43.7)
p value	0.016	0.462	0.558	0.390
Sex				
Male	168 (55.3)	211 (69.4)	194 (63.8)	153 (50.3)
Female	201 (65.5)	232 (75.6)	202 (65.8)	152 (49.5)
p value	0.010	0.088	0.608	0.840
Marital status				
Married	295 (61.2)	347 (72.0)	317 (65.8)	244 (50.6)
Widow/divorced	26 (51.0)	41 (80.4)	27 (52.9)	17 (33.3)
Unmarried	48 (61.5)	55 (70.5)	52 (66.7)	44 (56.4)
p value	0.356	0.404	0.177	0.030
Education level				
Below secondary	31 (55.4)	34 (60.7)	32 (57.1)	20 (35.7)
Secondary	164 (60.7)	192 (71.1)	165 (61.1)	137 (50.7)
College	110 (53.7)	158 (77.1)	136 (66.3)	97 (47.3)
University	64 (80.0)	59 (73.8)	63 (78.8)	51 (63.8)
p value	0.001	0.095	0.018	0.010
Professional group				
Worker[c]	93 (56.7)	118 (72.0)	103 (62.8)	74 (45.1)
Employee	141 (66.2)	162 (76.1)	156 (73.2)	126 (59.2)
Unemployed	135 (57.7)	163 (69.7)	137 (58.5)	105 (44.9)
p value	0.098	0.313	0.004	0.004
Monthly family income[d] (tenge)				
<36,000	264 (59.7)	315 (71.3)	278 (62.9)	211 (47.7)
≥36,000	105 (62.1)	128 (75.7)	118 (69.8)	94 (55.6)
p value	0.587	0.268	0.109	0.081

[a]Overweight: BMI≥25.0; it also included obesity (BMI≥30.0). [b]Hypertension: systolic blood pressure ≥140 mm of Hg and diastolic blood pressure ≥90 mm of Hg was treated as 'hypertension'. [c]Worker means 'blue-collar workers' engaged in hard physical labor. [d]1USD=120 tenge

Prevalence of CVD RFs

Fig. 1 describes the prevalence of CVD RFs among Kazakh male subjects. We found that tobacco smoking and alcohol drinking were more prevalent in the age group of 25–34 years, but smoking declined steadily with rising age, while alcohol drinking rapidly decreased by 35–44 years and again increased in the age group of 55–65 years. Overweight (BMI ≥ 25) was highest among the population age group of 45–54 years; however, it declined sharply in the age group of 55–65 years. Hypertension, as evidenced by SBP of ≥140 mm Hg and DBP of ≥90 mm Hg, was more common among the 45–54 year age group and rose to the highest level in the 55–65 years age group.

Fig. 2 elicits CVD RFs among the Kazakh female subjects. As expected, smoking prevalence was low among females, and was almost the same in all age groups. Alcohol drinking was

Table 3 Levels of knowledge of cardiovascular disease risk factors by socioeconomic status

	Level of knowledge		*p* value
	Poor	Good	
	Number (%)	Number (%)	
Total	459 (75.0)	152 (25.0)	0.170
Age group (years)	103 (72.5)	39 (27.5)	
25–34			
35–44	107 (69.9)	46 (30.1)	
45–54	142 (78.5)	39 (21.5)	
55–65	107 (79.3)	28 (20.7)	
Sex			
Male	239 (78.6)	65 (21.4)	
Female	220 (71.3)	87 (28.7)	0.038
Marital status			
Married	357 (74.1)	125 (25.9)	
Widow/divorced	44 (86.3)	7 (13.7)	
Never married	58 (74.4)	20 (25.6)	0.157
Education level			
Below secondary	48 (85.7)	8 (14.3)	
Secondary	206 (76.3)	64 (23.7)	
College	160 (78.0)	45 (22.0)	
University	45 (56.2)	35 (43.8)	<0.001
Professional group			
Worker[a]	129 (78.7)	35 (21.3)	
Employee	146 (68.5)	67 (31.5)	
Unemployed	184 (78.6)	50 (21.4)	0.023
Monthly family income[b] (tenge)			
<36,000	343 (77.6)	99 (22.4)	
≥36,000	116 (68.6)	53 (31.4)	0.022

[a]Worker means 'blue-collar workers' engaged in hard physical labor, [b]1USD=120 tenge

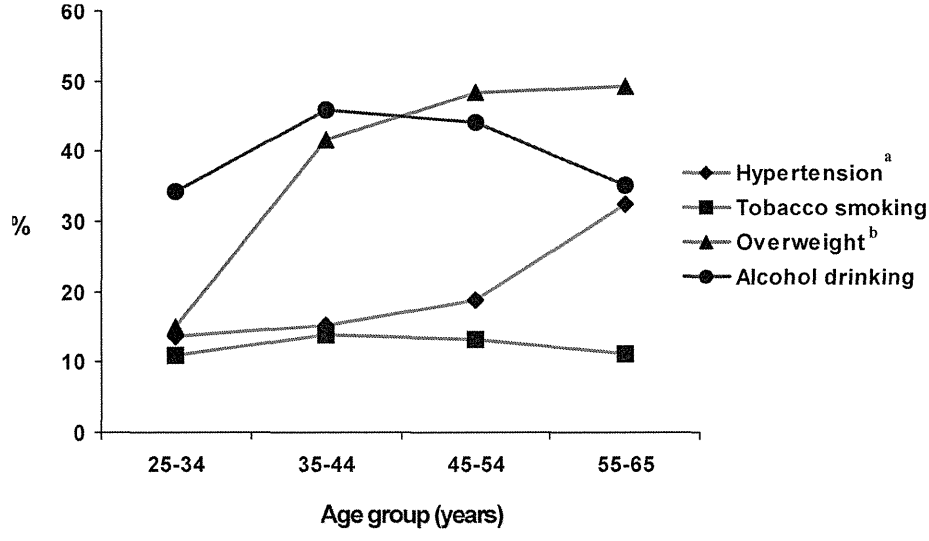

Fig. 2 Distributions of cardiovascular disease risk factors among females by age group. [a]Hypertension was defined as systolic blood pressure ≥140 mm of Hg and diastolic blood pressure ≥90 mm of Hg. [b]Overweight was defined as body mass index ≥25.

Table 4 Associations between risk factors for cardiovascular diseases and socioeconomic characteristics

	Tobacco smoking			Overweight[a]			Hypertension[b]			Alcohol drinking		
	No	Yes	OR[c]	No	Yes	OR	No	Yes	OR	No	Yes	OR
	Number (%)	Number (%)	(95% CI[d])	Number (%)	Number (%)	(95% CI)	Number (%)	Number (%)	(95% CI)	Number (%)	Number (%)	(95% CI)
Age group (years)												
25–34	111 (23.0)	31 (24.0)	1 (Reference)	119 (30.9)	23 (10.2)	1 (Reference)	128 (25.3)	14 (13.3)	1 (Reference)	81 (22.6)	61 (24.1)	1 (Reference)
35–44	118 (24.5)	35 (27.1)	1.1 (0.6–1.8)	100 (26.0)	53 (23.5)	2.8[e] (1.6–4.9)	135 (26.7)	18 (17.1)	1.2 (0.6–2.6)	90 (25.1)	63 (24.9)	0.9 (0.6–1.5)
45–54	143 (29.7)	38 (29.5)	1.0 (0.6–1.6)	89 (23.1)	92 (40.7)	5.3[e] (3.1–9.2)	146 (28.9)	35 (33.3)	2.2[f] (1.1–4.3)	108 (30.2)	73 (28.9)	0.9 (0.6–1.4)
55–65	110 (22.8)	25 (19.4)	0.8 (0.5–1.5)	77 (20.0)	58 (25.7)	3.9[e] (2.2–6.8)	97 (19.2)	38 (36.2)	3.6[e] (1.8–7.0)	79 (22.1)	56 (22.1)	0.9 (0.6–1.5)
Sex												
Male	213 (44.2)	91 (70.5)	1 (Reference)	198 (51.4)	106 (46.9)	1 (Reference)	260 (51.4)	44 (41.9)	1 (Reference)	174 (48.6)	130 (51.4)	1 (Reference)
Female	269 (55.8)	38 (29.5)	0.3[e] (0.2–0.5)	187 (48.6)	120 (53.1)	1.2 (0.9–1.6)	246 (48.6)	61 (58.1)	1.5 (1.0–2.2)	184 (51.4)	123 (48.6)	0.9 (0.6–1.2)
Marital status												
Married	372 (77.2)	110 (85.3)	1 (Reference)	296 (76.9)	186 (82.3)	1 (Reference)	399 (78.9)	83 (79.0)	1 (Reference)	282 (78.8)	200 (79.1)	1 (Reference)
Widow/ divorced	47 (9.8)	4 (3.1)	0.4 (0.1–1.2)	29 (7.5)	22 (9.7)	0.9 (0.5–1.7)	34 (6.7)	17 (16.2)	1.6 (0.8–3.2)	28 (7.8)	23 (9.1)	1.2 (0.7–2.2)
Unmarried	63 (13.1)	15 (11.6)	0.8 (0.4–1.4)	60 (15.6)	18 (8.0)	0.7 (0.4–1.2)	73 (14.4)	5 (4.8)	0.5 (0.2–1.2)	48 (13.4)	30 (11.9)	0.9 (0.5–1.5)
Education level												
Below secondary	46 (9.5)	10 (7.8)	1 (Reference)	40 (10.4)	16 (7.1)	1 (Reference)	41 (8.1)	15 (14.3)	1 (Reference)	34 (9.5)	22 (8.7)	1 (Reference)
Secondary	212 (44.0)	58 (45.0)	1.4 (0.7–3.0)	170 (44.2)	100 (44.2)	1.9 (1.0–3.7)	227 (44.9)	43 (41.0)	0.6 (0.3–1.3)	159 (44.4)	111 (43.9)	1.1 (0.6–2.0)
College	154 (32.0)	51 (39.5)	1.7 (0.8–3.7)	125 (32.5)	80 (35.4)	1.9 (1.0–3.7)	176 (34.8)	29 (27.6)	0.5 (0.2–1.0)	117 (32.7)	88 (34.8)	1.2 (0.7–2.2)
University	70 (14.5)	10 (7.8)	0.8 (0.3–2.0)	50 (13.0)	30 (13.3)	1.8 (0.8–3.0)	62 (12.3)	18 (17.1)	0.9 (0.4–2.0)	48 (13.4)	32 (12.6)	1.1 (0.5–2.1)
Professional group												
Worker[g]	118 (24.5)	46 (35.7)	1 (Reference)	109 (28.3)	55 (24.3)	1 (Reference)	145 (28.7)	19 (18.1)	1 (Reference)	91 (25.4)	73 (28.9)	1 (Reference)
Employee	174 (36.1)	39 (30.2)	0.8 (0.5–1.4)	121 (21.4)	92 (40.7)	1.4 (0.9–2.1)	172 (34.0)	41 (39.0)	1.6 (0.9–3.0)	125 (34.9)	88 (34.8)	0.9 (0.6–1.4)
Unemployed	190 (39.4)	44 (34.1)	0.8 (0.5–1.2)	155 (40.3)	79 (35.0)	0.9 (0.6–1.3)	189 (37.4)	45 (42.9)	1.5 (0.8–2.7)	142 (39.7)	92 (36.4)	0.8 (0.5–1.2)
Monthly family income[h] (tenge)												
<36,000	345 (71.6)	97 (75.2)	1 (Reference)	293 (76.1)	149 (65.9)	1 (Reference)	369 (72.9)	73 (69.5)	1 (Reference)	258 (72.1)	184 (72.7)	1 (Reference)
≥36,000	137 (28.4)	32 (24.8)	1.1 (0.7–1.7)	9223.9)	77 (34.1)	1.6[f] (1.1–2.4)	137 (27.1)	32 (30.5)	0.9 (0.6–1.5)	100 (27.9)	69 (27.3)	1.0 (0.7–1.5)
Knowledge												
Poor	351 (72.8)	108 (83.7)	1 (Reference)	299 (77.7)	160 (70.8)	1 (Reference)	379 (74.9)	80 (76.2)	1 (Reference)	253 (70.7)	206 (81.4)	1 (Reference)
Good	131 (27.2)	21 (16.3)	1.2 (0.8–1.8)	86 (22.3)	66 (29.2)	1.7[f] (1.2–2.4)	127 (25.1)	25 (23.8)	1.0 (0.7–1.4)	105 (29.3)	47 (18.6)	0.7[f] (0.5–0.9)
Total	482 (78.9)	129 (21.1)		385 (63.0)	226 (37.0)		506 (82.8)	105 (17.2)		358 (58.6)	253 (41.4)	

[a]Overweight: body mass index; BMI≥25 kg/m^2 was treated as 'overweight'; it also included obesity. [b]Hypertension: systolic blood pressure ≥140 mm of Hg and diastolic blood pressure ≥90 mm of Hg was treated as 'hypertension'. [c]OR: odds ratio; ORs were adjusted for age and sex. In knowledge, OR was adjusted for age, sex, income, and education. [d]CI: confidence interval. [e]: $p<0.001$. [f]: $p<0.05$. [g]Worker means 'blue-collar workers' engaged in hard physical labor. [h]1USD=120 tenge.

highest in the age group of 35–44 years, and it declined gradually with growing age. Overweight was more pronounced in the age group of 35–44 years, and steadily rose until it peaked in the 55–65 year age group. However, unlike with males, the prevalence of hypertension was not different until the 45–54 year age group. Hypertension was at its highest among the age group of 55–65 years.

Association of CVD RFs with socioeconomic factors

Odds ratios (ORs) and 95% confidence intervals (CIs) were estimated through a logistic regression model to explore association between CVD RFs and socioeconomic factors. As shown in Table 4, females were less likely to be tobacco smoker than males (OR=0.3, 95% CI=0.2–0.5, $p<0.001$). Overweight was many times more likely among respondents of 45–54 (OR=5.3, 95% CI=3.1–9.2, $p<0.001$) and 55–65 years (OR=3.9, 95% CI=2.2–6.8, $p<0.001$). Age was also significantly associated with hypertension, especially for those aged 55–65 (OR vs. 25–34 were 3.6, 95% CI=1.8–7.0, $p<0.001$). Risk of overweight increased significantly among subjects with a higher income level (OR=1.6, 95% CI=1.1–2.4, $p=0.010$), and there was more hypertension (OR=1.6, 95% CI=0.8–3.2) among widow/divorced subjects compared with married.

People with a good level of knowledge were significantly less likely to be alcohol drinkers (OR=0.7, 95% CI=0.5–0.9, $p=0.027$) compared with less knowledgeable people. However, the risk of being overweight was more likely among respondents with a good level of knowledge and an OR of 1.7 (95% CI=1.2–2.4, $p=0.006$).

DISCUSSION

We identified a rural population with a very low level of knowledge about CVD RFs. Poor knowledge about CVD RFs and high prevalence of RFs demonstrated a clear relationship with socioeconomic indicators of respondents. Thus, levels of knowledge of the respondents were strongly associated with sex, education level, occupational status, and income. A good level of knowledge was further associated with a low risk of smoking and alcohol drinking, but at the same time, a high risk of being overweight.

Since Kazakhstan has conducted activities for healthy lifestyle formation in recent years, more than 60.0% of the studied population were able to identify at least one CVD RF. However, only 25.0% of the population could correctly assess the contributions the given factors have on the development of both hypertension and ischemic heart disease. Although various researchers have their own methods of assessing knowledge, an inadequate level of CVD RF knowledge also was revealed in their studies.[8-10,12,13] Our findings of low rates of RF identification and low levels of knowledge were reported in the same way by their studies. They reported that low levels of RF identification and low levels of knowledge among respondents were greatest among males,[9,29] aged participants.[9,11] those with a less education[9-11,29] and income,[9-11] and manual workers.[11] Education was the strongest predictor of CVD RF-related knowledge.[9-11] Despite the rural population being aware of CVD RFs, our study found that there was a low amount of knowledge about CVDs biological RFs, such as blood pressure and cholesterol.[10] This may be explained by a lack of appropriate healthcare promotion through the media and inadequate preventive measures of health care workers,[11] particularly from those in primary care, as well as inadequate preventive behavioral patterns.[10] Experience from developed countries has shown the adoption of measures to reduce RFs results in a significant reduction in premature mortality from CVDs.[2,4,16,30] However, good RF-related knowledge about CVD is not always an indicator of better health and healthy lifestyles. We revealed that many CVD RF-knowledgeable people still exhibited

unhealthy lifestyles, and therefore continued to have RFs related to CVD.[8] Evidence has shown that knowledge of disease is not enough to improve the perception of the people and attitudes towards behavioral changes.[8,11,19,29] The degree of effort people put towards a healthy lifestyle is a strong predictor of the achievement of educational and healthy life style interventions.

Our study revealed that tobacco smoking did not have a significant association with income. However, risk of overweight and hypertension were positively associated with higher income and occupational status.[5,19,26,29] The tendency of a relatively higher prevalence of BMI[18] and hypertension among employees can be explained by an association with more sedentary lifestyles,[22] with lack of physical activity, and with the stress burden of public service.[13] Stress at work and at home and depression make it more difficult for people to adopt and sustain a healthy lifestyle and impede lifestyle change.[5] We found a positive relationship between the level of income and overweight,[14,15,28] which was fully connected with Westernized nutrition[27] and lifestyles. Also, being overweight depends on the nutritional habits of the Kazakh population, where a meat and high calorie diet dominate. Furthermore, obesity is becoming just as dominant in developing countries, countries with economies in transition,[30] and in middle income[4] countries.

Although most studies show an inverse relationship between the prevalence of RF and income of rural populations,[3,19] we did not find such a relationship in our study except for overweight. There were also gender differences in the prevalence of excess body weight and hypertension. Whereas RFs sharply increased among the male group aged 45–54 years as compared with younger age groups, they increased gradually among women.

Although the present study clearly verified associations of CVD RFs prevalence with knowledge and socioeconomic characteristics, there were some limitations. This was a cross-sectional study and results do not show any evaluation of trends. We did not assess associations of other important RFs for CVD development, such as physical activity, because of the difficulty of standardizing results. Moreover, the rural areas did not have enough sport facilities for engaging in sport activities. We could not quantify alcohol consumption and measure the levels of cholesterol because of lack of laboratory accessibility in rural PHC organizations. However, different important factors which were revealed in our study can be used as a guideline for policy makers in planning and implementing programs and health-promotion campaigns designed to lower CVD-related mortality and morbidity.

In conclusion, CVD RFs were very high among the Kazakh population, although levels of knowledge for identifying those RFs were very low. This disparity of higher prevalence of RFs and little knowledge about them would surely put subjects at greater risk of cardiovascular diseases. Promotion of awareness programmes at the primary health care level with emphasis on changing behavioral RF can reduce CVD-related morbidity and mortality and make for a better quality of life of high-risk subjects.

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ORIGINAL PAPER

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ELDERLY HEALTH AND ITS CORRELATIONS AMONG UZBEK POPULATION

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ABSTRACT

This study was conducted from November, 2007 to May, 2008 to evaluate the health status of the elderly and correlated factors affecting their health. We collected data from 682 individuals 65 years or older (214 male) from greater Tashkent City in Uzbekistan. The study revealed that 75.4% of the respondents were aged <75 years and that 16.8% of them were not educated. About three-quarters of the respondents rated themselves as 'healthy.' The odds ratios (ORs) and 95% confidence intervals (CIs) were estimated through a logistic regression model to determine correlations of elderly health, and adjusted for age and sex. The elderly who had additional income were 2.6 times (95% CI=1.8–4.0) more likely to be healthy. Similarly, those <75 years old (OR=1.5, 95% CI=1.0–2.2), were able to do everyday duties (OR=6.0, 95% CI=3.8–9.3), and those who were married (OR=4.1, 95% CI=1.7–9.7) were also healthy. Conversely, males (OR=0.6, 95% CI=0.4–0.9) and the elderly who were supported by sources other than their own income from work were not healthy. We concluded that having a strong family relationship and adhering to a traditional lifestyle are important for protecting elderly health in Uzbekistan. Substantial financial support and personal care are necessary for the elderly. Creating a healthy atmosphere for them at an individual and family level could ensure a better quality life for the elderly in Uzbekistan.

Key Words: Elderly, Elderly health, Correlations, Uzbekistan

INTRODUCTION

Decreases in infant mortality and fertility combined with an increasing life expectancy have led a large number of countries to have a growing proportion of aged individuals with specific healthcare needs.[1)] As the prevalence of most chronic diseases is high in old age, societies need changes in their healthcare systems capable of coping with the growing concerns of elderly health. Population aging is caused primarily by decline in fertility, and is thus associated with a decline in family size and a rise in the number of the elderly in relation to the younger population. This increases pressure on children, who are a major source of support for the elderly.[2)]

Uzbekistan is the most populated country in Central Asia. Since the 1970s, its population has more than doubled. The most recent estimates put the total population at 27 million,[3)] and the share of the population aged 0–14 decreased from 45% of the total population in 1970 to

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33.2% in 2005.[4] The share of the population aged over 65 years had reached 4.7% in 2005 in Uzbekistan,[5] and pressures on the healthcare system from an aging population (which also arise in many countries of Western Europe) are not yet apparent. However, if the elderly population continues to increase as expected, Uzbekistan could be faced with this problem in the near future. It also signals the upcoming pressures on the Uzbek healthcare system that has already emerged as a threat to many Western countries and Japan.[5]

In many developing countries and countries with economies in transition, the ageing population is a stringent problem.[6] Older persons often are left behind without traditional family support and even without adequate financial resources. Elderly women are particularly vulnerable economically, especially when their role is restricted to non-remunerated work for family upkeep and they are dependent on others for their support and survival.[7] Even older persons in developed countries and countries with economies in transition lack basic services and have insufficient economic and community resources.[6] In most situations, a large number of persons reaches old age with minimal literacy, which limits their capacity to earn a livelihood and may thus influence their enjoyment of health and well-being.[2] But significant differences exist between developed and developing countries in terms of the kinds of households in which older persons live. In developing countries, a large proportion of older persons live in multigenerational households.[2] On the other hand, there has been a significant rise in the proportion of elderly living alone in industrialized countries.[5]

Until now, strong family relationships and adherence to a traditional lifestyle have been preserved in Uzbekistan, where the idea of elderly people living separated from the family is inconceivable. Parents in declining years usually live with their children and are taken care of by them. This is usually with one of the sons and his family.[8] Traditionally, families have provided financial, physical, and psychological support to their parents in the same household. Substantial financial support is necessary for older people, and when they become frail, personal care is also essential.[9]

Self-rated health is easily measured in population surveys, and is a useful "opener" in interview situations that allows interviewers to seek more nuanced and complex responses about people's perceptions of their health.[10] Also, self-rated health can be useful for socio-epidemiological studies.[11] Despite being a subjective measure of health, self-rated health has shown itself to be a valid indicator, being a good predictor of mortality,[12] morbidity, and disability.[13] Furthermore, it has good test-retest reliability.[14]

Although there has been much international research dedicated to the problem of care for the elderly by family caregivers,[15-17] few researchers have examined the correlates affecting self-rated health in the older population, and self-rated health has, to our knowledge, hitherto not been examined. Therefore, our study was aimed at exploring possible obstacles and related factors which are a hindrance to healthy living for the elderly in Uzbekistan, and also to find associations between those related factors and self-rated health status.

MATERIALS AND METHODS

A cross-sectional study was conducted to collect data from 682 elderly persons aged 65 years or older (214 males, 486 females). Data were collected by face-to-face interviews from respondents of two regions (Tashkent City, Tashkent Region) in Uzbekistan from November, 2007 to May, 2008, using structured questionnaires. Households were selected from these two regions through a simple random sampling from the list of eligible households, provided by the local government office. Extremely frail elderly who were unable to respond to the interview were

excluded. Although our target sample was 728, we could interview only 682, with a response rate of 93.7%. Some of the respondents were absent, some were sick, and a few were reluctant to participate. The questionnaire included items on socio-demographic factors (age, gender, place of residence, ethnicity, religion), socioeconomic factors (education level, marital status, personal income, and family support), and self-assessment of their health status. The questionnaire was developed and pre-tested among elderly volunteers before actual data collection. Before data collection, written informed consent was obtained from all the respondents after explaining the study to them in detail.

Health indicators

Self-rated health was used to measure health status in this study. The question asking respondents to rate their own health was phrased as follows: "How would you rate your health today?" Respondents were given five options: very good, good, satisfactory, bad, and very bad, to rate their health on the day of the interview. We subsequently regrouped their answers into either healthy (ratings of "very good," "good" and "satisfactory") or not healthy (ratings of "bad" and "very bad").

Socio-demographic factors

The following socio-demographic factors were studied for possible associations with self-rated health: age groups (<75 years, 75 years and over), gender (male, female), marital status (married, not married, divorced, widowed) and place of residence (urban, rural). We determined the association of each socio-demographic factor with self-rated health status.

Socio-economic factors

The following socio-economic factors were studied for possible associations with self-rated health: education (in 6 groups: not educated, primary, low secondary, secondary, vocational education, and higher), occupation (in 3 groups: still working, jobless, and retired), kind of job (in 4 groups: state employee, family business, private firms, and jobless) and monetary support (in 7 groups: work, pension, savings, son's support, daughter's support, relative's support, and others). Family support also was examined by means of item questions "who takes care of you when you are ill?" "who accompanies you to the doctor?" and "who pays for your treatment?" (in 6 groups: self, spouse, son, daughter, daughter-in-law, and others). We determined the association of each socio-economic indicator with self-rated health.

Statistical analysis

Descriptive statistics like the frequency (percentage) for categorical data and the mean (±standard deviation, SD) for continuous data were used where appropriate. The association between the correlating factors and self-rated health status were examined by calculating odds ratio (OR) and 95% confidence interval (CI) using a logistic regression model. The OR was adjusted for age and sex.

Data were analyzed using the Statistical Package for the Social Science® (SPSS) for Windows, version 15.0 software (SPSS Inc., Ill., USA).

RESULTS

Table 1 shows the background characteristics of the elderly. The average age of the respondents was 71.0 years, 75.4% of which were in the age group of <75 years, and 68.6% of total

respondents were female. More than half of respondents were living in urban areas and 72.4% were married.

People who could write and read Uzbek characters were considered as educated. Accordingly, 83.2% were educated, most of whom were between the primary and secondary level of education (about 73.5%); however, 16.8% of them were not educated. The percentage of elderly persons who belonged to the higher education groups was smaller than that of those who belonged to the lower groups. Among the 682 interviewees that self-rated their health, 3.1% evaluated their health as "very good," 32.7% as "good," 41.1% as "satisfactory," 19.8% as "bad" and 3.4% evaluated their health as "very bad."

Table 2 describes the association of self-rated health (healthy or not healthy) of the respondents with different related factors e.g., age, sex, marital status, place of residence, education, job status, kind of job, source of monetary support, additional earnings, activity (can still work or not), and family support. The results showed that male respondents were not satisfied with their health status (OR=0.6, 95% CI=0.4–0.9). Similar low OR was found among urban respondents (OR=0.8, 95% CI=0.5–1.1), and state employees (OR=0.6, 95% CI=0.1–3.3). Those who had additional earnings were three times more likely to have a "feel good" health status (OR=2.6, 95% CI=1.8–4.0) compared with their counterparts. Self-rated health status was significantly different between subjects who were able to do everyday duties and those who could not (OR=6.0, 95% CI=3.8–9.3): i.e., those who were able to do every day duties were six times more likely to feel healthy. Associations between self-rated health and family support (to be accompanied, to be taken care of, to have treatment paid for) showed that in most cases, those who were accompanied by somebody, were taken care of by family and had their treatment paid for by family members more likely to be in good health conditions.

Logistic regression analysis with self-rated health as a dependent variable was performed. Table 3 shows the results of age and sex-adjusted associations between the health status of respondents and some related factors, such as marital status, kind of job, job satisfaction, source of monetary support, and family support in case of illness. The results indicate that marital status had a significant impact on the self-rated health status of the elderly, and the possibility of good self-rated health was higher in those who were married (OR=4.1, 95% CI=1.8–9.7). In the analysis of the source of monetary support, results showed that those who were supported by pension, a son, or relatives were not healthy (OR ranges from 0.5–0.7).

Table 4 shows associations of related factors with the self-rated health of the respondents by age. In the age group under 75, those who were still working were 2.6 times more likely to be healthy (OR=2.6, 95% CI=1.1–6.3). Of the elderly aged 75 or older, those with additional earnings were six times more likely to feel in good health compared with those without such earnings. These results demonstrate that additional income had a significant impact on self-rated health status of the older elderly (OR=6.5, 95% CI=2.7–15.6). Also, self-rated health status was significantly different between those who were able to do every day duties and those who could not, in the group of the elderly under 75 (OR=9.8, 95% CI=5.6–16.6).

Table 5 demonstrates associations of related factors with the self-rated health of respondents by sex. In both groups, all the factors listed had significant influences on self-rated health status. Also, male respondents who still work were almost two times (OR=6.3, 95% CI=0.8–49.2) more satisfied with their self-rated health status than were females (OR=3.0, 95% CI=1.2–7.7). Similar high OR was found for males who had additional earnings (OR=3.8, 95% CI=2.0–7.6) and who were able to perform every day duties (OR=6.0, 95% CI=3.0–11.9) in comparison with females overall.

The elderly retired for various reasons. Considering that stresses arising from the job environment greatly influence physical well-being and the psychological status of people, we analyzed

reasons for their work cessation under such stresses. The results showed that out of 609 working people 70.8% retired because they had reached pension age, 10.0% because of health problems, and 3.1% because of other (domestic) reasons. Only 1.6% of the elderly expressed that they retired because they did not need the job any more (data not shown).

Family support is considered one of the important issues for healthy living of the elderly: parents' treatment was paid for by their sons in 46.5% of cases and by a daughter-in-law in 8.1% of cases. Only 15.4% of the elderly paid for their treatment by themselves (data not shown).

Table 1 Background characteristics of respondents

Characteristics	Male	Female	Total
	N (%)	N (%)	N (%)
Total	214 (31.4)	468 (68.6)	682 (100.0)
Age groups (years)			
<75	168 (78.5)	346 (73.9)	514 (75.4)
≥75	46 (21.5)	122 (26.1)	168 (24.6)
Mean=71.0 SD=5.1 Minimum=65.0 Maximum=87.0			
Residence			
Urban	158 (73.8)	279 (59.6)	437 (64.1)
Rural	56 (26.2)	189 (40.4)	245 (35.9)
Region			
Tashkent City	98 (45.8)	212 (45.3)	310 (45.5)
Tashkent Region	116 (54.2)	256 (54.7)	372 (54.5)
Education			
Not educated	44 (20.6)	71 (15.2)	115 (16.8)
Primary	37 (17.3)	134 (28.7)	171 (25.1)
Low secondary	70 (32.7)	122 (26.1)	192 (28.2)
Secondary	35 (16.4)	103 (22.0)	138 (20.2)
Vocational education	18 (8.4)	21 (4.5)	39 (5.7)
Higher	10 (4.7)	17 (3.6)	27 (4.0)
Marital status			
Married	152 (71.0)	342 (73.1)	494 (72.4)
Not married	8 (3.7)	15 (3.2)	23 (3.4)
Divorced	21 (9.8)	34 (7.3)	55 (8.1)
Widowed	33 (15.5)	77 (16.4)	110 (16.1)
Self-rated health status			
Very good	13 (6.1)	8 (1.7)	21 (3.1)
Good	51 (23.8)	172 (36.8)	223 (32.7)
Satisfactory	87 (40.7)	193 (41.2)	280 (41.1)
Bad	45 (21.0)	90 (19.2)	135 (19.8)
Very bad	18 (8.4)	5 (1.1)	23 (3.4)
Overall health status[a]			
Healthy	151 (70.6)	373 (79.7)	524 (76.8)
Not healthy	63 (29.4)	95 (20.3)	158 (23.2)

[a]Overall health status constitutes combination of satisfactory, good, and very good health in 'Healthy,' and bad and very bad health in 'Not healthy' group.

Table 2 Associations of related factors with self-rated health of respondents

Characteristics	Healthy	Not healthy	OR[a]	95% CI[b]	*p* value
	N (%)	N (%)			
Age group (years)					
≥75	120 (71.4)	48 (28.6)	1	Ref	
<75	404 (78.6)	110 (21.4)	1.5	1.0–2.2	0.056
Sex					
Female	373 (79.7)	95 (20.3)	1	Ref	
Male	151 (70.6)	63 (29.4)	0.6	0.4–0.9	0.009
Marital status					
Married	382 (77.3)	112 (22.7)	1	Ref	
Single	142 (75.5)	46 (24.5)	1.1	0.8–1.7	0.619
Place of residence					
Rural	195 (79.6)	50 (20.4)	1	Ref	
Urban	329 (75.3)	108 (24.7)	0.8	0.5–1.1	0.201
Educational level					
Educated	438 (77.2)	129 (22.8)	1	Ref	
Not educated	86 (74.8)	29 (25.2)	0.9	0.5–1.3	0.570
Job status					
Retired	457 (75.0)	152 (25.0)	1	Ref	
Still working	67 (91.8)	6 (8.2)	3.7	1.5–8.7	0.001
Kind of job					
State employee	4 (66.7)	2 (33.3)	1	Ref	
Others	520 (76.9)	156 (23.1)	0.6	0.1–3.3	0.553
Monetary support					
Others	148 (75.1)	49 (24.9)	1	Ref	
Self	376 (77.5)	109 (22.5)	1.1	0.7–1.6	0.501
Additional earnings					
No	300 (70.9)	123 (29.1)	1	Ref	
Yes	224 (86.5)	35 (13.5)	2.6	1.8–4.0	<0.001
Ability to perform everyday duties					
No	45 (44.1)	57 (55.9)	1	Ref	
Yes	479 (82.6)	101 (17.4)	6.0	3.8–9.3	<0.001
Can you still work?					
No	409 (75.9)	130 (24.1)	1	Ref	
Yes	115 (80.4)	28 (19.6)	1.3	0.8–2.0	0.253
Who accompanies you to the doctor?					
Others	347 (78.2)	97 (21.8)	1	Ref	
Self	177 (74.4)	61 (25.6)	0.8	0.5–1.1	0.264
Care provider					
Others	500 (77.5)	145 (22.5)	1	Ref	
Self	24 (64.9)	13 (35.1)	0.5	0.2–1.1	0.076
Treatment payer					
Others	453 (78.5)	124 (21.5)	1	Ref	
Self	71 (67.6)	34 (32.4)	0.6	0.4–1.0	0.015

[a]OR: Odds ratio; ORs were adjusted for sex in age group, for age in sex group, and both for age and sex in other variables. [b]CI: Confidence interval.

Table 3 Results of binary logistic regression to explore association between health status of respondents and related factors

Characteristics	Healthy		Not healthy		OR[a]	95% CI[b]	*p* value
	N	(%)	N	(%)			
Marital status							
Never Married	11	(2.1)	12	(7.6)	1	Ref	
Married	382	(72.9)	112	(70.9)	4.1	1.7–9.7	0.001
Divorced	44	(8.4)	11	(7.0)	4.4	1.5–12.7	0.007
Widowed	87	(16.6)	23	(14.6)	4.7	1.7–12.2	0.006
Kind of job							
State employee	9	(1.7)	5	(3.2)	1	Ref	
Family business	17	(3.2)	4	(2.5)	2.0	0.4–9.8	0.373
Private firms	32	(6.1)	6	(3.8)	3.0	0.7–12.1	0.134
Jobless	466	(88.9)	143	(90.5)	1.8	0.6–5.6	0.307
Do you like your job?							
Yes	40	(7.6)	14	(8.9)	1	Ref	
No	18	(3.4)	1	(0.6)	5.5	0.7–45.3	0.113
Jobless	466	(88.9)	143	(90.5)	1.2	0.6–2.2	0.676
Source of monetary support							
Work	25	(4.8)	4	(2.5)	1	Ref	
Pension	346	(66.0)	104	(65.8)	0.6	0.2–1.7	0.299
Savings	5	(1.0)	1	(16.7)	1.0	0.9–11.2	0.996
Son's support	113	(21.6)	40	(25.3)	0.5	0.2–1.6	0.234
Daughter's support	25	(4.8)	5	(3.2)	1.0	0.2–4.1	0.967
Relative's support	6	(1.1)	2	(1.3)	0.7	0.1–4.8	0.693
Others	4	(0.8)	2	(1.3)	0.3	0.1–2.5	0.288
Who will care for you in case of illness?							
Self	49	(9.4)	16	(10.1)	1	Ref	
Spouse	105	(20.0)	33	(20.9)	1.2	0.6–2.3	0.677
Son	48	(9.2)	15	(9.5)	1.2	0.5–2.6	0.716
Daughter	155	(29.6)	43	(27.2)	1.1	0.6–2.2	0.732
Daughter-in-law	133	(25.4)	48	(30.4)	0.9	0.4–1.7	0.632
Others	34	(6.5)	3	(1.9)	3.5	0.7–16.8	0.116

[a]OR: Odds ratio; ORs were adjusted for age and sex. [b]CI: Confidence interval.

Table 4 Associations of related factors with self-rated health of respondents by age

Characteristics	Age group (< 75 years)					Age group (≥ 75 years)				
	Healthy	Not healthy				Healthy	Not healthy			
	Frequency (%)	Frequency (%)	OR[a]	95% CI[b]	*p* value	Frequency (%)	Frequency (%)	OR	95% CI	*p* value
Sex										
Female	282 (81.5%)	64 (18.5%)	1	Ref		91 (74.6%)	31 (25.4%)	1	Ref	
Male	122 (72.6%)	46 (27.4%)	0.6	0.4–0.9	0.021	29 (63.0%)	17 (37.0%)	0.6	0.3–1.2	0.140
Marital status										
Married	286 (79.2%)	75 (20.8%)	1	Ref		96 (72.2%)	37 (27.8%)	1	Ref	
Single	118 (77.1%)	35 (22.9%)	1.1	0.7–1.8	0.596	24 (68.6%)	11 (31.4%)	1.2	0.5–2.7	0.674
Residence										
Rural	131 (81.9%)	29 (18.1%)	1	Ref		64 (75.3%)	21 (24.7%)	1	Ref	
Urban	273 (77.1%)	81 (22.9%)	0.7	0.5–1.2	0.223	56 (67.5%)	27 (32.5%)	0.7	0.3–1.3	0.262
Educational level										
Educated	369 (79.0%)	98 (21.0%)	1	Ref		69 (69.0%)	31 (31.0%)	1	Ref	
Uneducated	35 (74.5%)	12 (25.5%)	0.8	0.4–1.5	0.469	51 (75.0%)	17 (25.0%)	1.3	0.7–2.7	0.398
Job status										
Others	351 (77.1%)	104 (22.9%)	1	Ref		106 (68.8%)	48 (31.2%)	1	Ref	
Still working	53 (89.8%)	6 (10.2%)	2.6	1.1–6.3	0.025	14 (100%)	NC[d]	NC	NC	0.013
Kind of job										
Others	400 (78.7%)	108 (21.3%)	1	Ref						
State employee	4 (66.7%)	2 (33.3%)	0.5	0.1–3.0	0.473	NA[c]	NA	NA	NA	NA
Monetary support										
Others	107 (76.4%)	33 (23.6%)	1	Ref		41 (71.9%)	16 (28.1%)	1	Ref	
Self	297 (79.4%)	77 (20.6%)	1.2	0.7–1.9	0.463	79 (71.2%)	32 (28.8%)	1.0	0.5–2.0	0.918
Additional earnings										
No	243 (74.8%)	82 (25.2%)	1	Ref		63 (90.0%)	7 (10.0%)	1	Ref	
Yes	161 (85.2%)	28 (14.8%)	1.9	1.2–3.1	0.005	57 (58.2%)	41 (41.8%)	6.5	2.7–15.6	<0.001
Ability to perform everyday tasks										
No	28 (37.8%)	46 (62.2%)	1	Ref		37 (26.4%)	11 (22.9%)	1	Ref	
Yes	376 (85.5%)	64 (14.5%)	9.8	5.6–16.6	0.000	103 (73.6%)	17 (60.7%)	1.8	0.8–4.2	0.169
Can you still work?										
No	290 (78.0%)	82 (22.0%)	1	Ref		119 (71.3%)	48 (28.7%)	1	Ref	
Yes	114 (80.3%)	28 (19.7%)	1.2	0.7–1.9	0.566	1 (100.0%)	0 (0.0%)	NC	NC	0.526
Who accompanies you to the doctor?										
Others	250 (80.4%)	61 (19.6%)	1	Ref		97 (72.9%)	36 (27.1%)	1	Ref	
Self	154 (75.9%)	49 (24.1%)	0.8	0.5–1.2	0.222	23 (65.7%)	12 (34.3%)	0.7	0.3–1.6	0.400
Care provider										
Others	384 (79.5%)	99 (20.5%)	1	Ref		116 (71.6%)	46 (28.4%)	1	Ref	
Self	20 (64.5%)	11 (35.5%)	0.5	0.2–1.0	0.049	4 (66.7%)	2 (33.3%)	0.8	0.1–4.5	0.793
Treatment payer										
Others	343 (80.9%)	81 (19.1%)	1	Ref		110 (71.9%)	43 (28.1%)	1	Ref	
Self	61 (67.8%)	29 (32.2%)	0.5	0.3–0.8	0.006	10 (66.7%)	5 (33.3%)	0.8	0.3–2.4	0.669

[a]OR: Odds ratio. [b]CI: Confidence interval. [c]NA: Not applicable. [d]NC: Not calculable.

Table 5 Associations of related factors with self-rated health of respondents by sex

Characteristics	Male					Female				
	Healthy	Not healthy				Healthy	Not healthy			
	Frequency (%)	Frequency (%)	OR[a]	95% CI[b]	*p* value	Frequency (%)	Frequency (%)	OR	95% CI	*p* value
Job status										
Others	14 (93.3%)	1 (6.7%)	1	Ref		53 (91.4%)	5 (8.6%)	1	Ref	
Still working	137 (68.8%)	62 (31.2%)	6.3	0.8–49.2	0.045	320 (78.0%)	90 (22.0%)	3.0	1.2–7.7	0.018
Additional earnings										
No	75 (85.2%)	13 (14.8%)	1	Ref		149 (87.1%)	22 (12.9%)	1	Ref	
Yes	76 (60.3%)	50 (39.7%)	3.8	2.0–7.6	<0.001	224 (75.4%)	73 (24.6%)	2.2	1.4–4.0	0.002
Ability to perform everyday tasks										
No	133 (79.2%)	35 (20.8%)	1	Ref		346 (84.0%)	66 (16.0%)	1	Ref	
Yes	18 (39.1%)	28 (60.9%)	6.0	3.0–11.9	<0.001	27 (48.2%)	29 (51.8%)	5.6	3.1–10.1	<0.001

[a]OR: Odds ratio. [b]CI: Confidence interval.

DISCUSSION

About a quarter of the elderly population in this study rated their health status as bad or very bad. This result is in agreement with findings reported in some European and Asian countries and North America. A similar study conducted in Shanghai reported that 50.6% of respondents rated their health in the lower two categories of a four category scale.[18] Another study[19] found that 16% of the adult population in Rotterdam viewed their health as not very healthy or not healthy at all (the lowest two of five categories), and Zack *et al.*[20] reported that 15.5% of adult Americans rated their health as fair or poor (the lowest two of five ordinal categories) in 2001. However, another study in Singapore indicated that 98.5% of Singaporeans rated their health as very good, good, or moderate, with only 1.5% reporting bad or very bad health.[10] This reflects the overall health situation of their country. An average Singaporean might feel healthier than an average American. Moreover, differences in methodology of the survey, such as the kinds of rating scales used, the method involved in eliciting a response, and the way in which questions were phrased, might in part explain the differences observed. The results suggest that older adults in Uzbekistan do not necessarily appear more negative in their ratings of their health compared with those in other countries.

Age is shown to be a very important and relevant factor in evaluating one's health status. With increasing age, non-communicable diseases like diabetes and hypertension tend to rise. Sometimes fatal consequences arise from these diseases in the form of heart disease, kidney disease, and paralyses that cripple the life of the elderly. Given that the majority of these illnesses are more prevalent among the elderly, self-rated health usually worsens with advanced age.[20-22] In addition, results of our study might reflect poor self-evaluation of the health status which declines with age.

Disparities between the sexes are well documented in the international literature.[23,24] As was found in the present study, females, more than males, generally evaluated their own state of health as good. The principal explanation given for this poor self-perception of male health status can be related to the distinct nature of Uzbek adult life, including the fact that males participate in the paid work market most of the time. Males in Uzbek culture are the breadwinners of the whole house, which involves many work-related stresses. Our findings are also in agreement with similar results obtained from a study in Estonia which reported that women had higher ratings for health.[24] However, in some countries, such as Pakistan and Finland, females were more likely to report poor self-rated health than men.[25,26] This inconsistency may arise from differences in the culture and customs of those countries.

Among indicators of socioeconomic level, education probably has been used the most, since it is a stable attribute in adult life, in contrast to occupational and income statuses, which can vary with time.[22] As expected, the results showed that a large percentage of the elderly belonged to the lowest education level. The current Uzbek older generation had fewer opportunities to receive a formal education, because their childhood and youth were during World War II and postwar devastation. American national statistics show that about 20% of the population aged 65 and older graduated from college.[27] 6.8% of Korean older adults were college graduates,[28] whereas in our study only 5.7% of elderly Uzbeks were. Education has a direct influence on the individual's attitude toward his/her health. Educated people are more health conscious, make more effective use of preventive measures, are more likely to practice a healthy life style and are quick to notice disease, and are more able to give themselves first aid and to seek quality health care services.[29] Against our expectation that education does have some value as an essential socioeconomic predictor of health in an ageing society, we did not find any significant impact of education status on the health status of the elderly. This may be because very few elderly (only

4%) received higher education, and most of them were below secondary level of education.

We found that those having some type of job expressed better health status. It was also found that those who were still capable of working felt six-times healthier than those who were not. This implies that having a job is important not only for earning money, but also for living a healthy life. Szwarcwald *et al.* discussed that in relation to the other socioeconomic determinants of self-evaluation of health, work status plays an important role as well as material assets, particularly for males. For males, paid work is essential for social well-being. For females, quality of life does not depend on work alone, but also on the support of a companion or family providing necessities for material comfort.[20] Although strenuous work is not appropriate for the health of the elderly, a provision of light and entertaining work can strengthen their morale in the sense that they feel themselves important members of society, not as a redundant or as a burden.

Elderly people usually depend on pensions as a source of income. Of those who need additional monetary support from others, most of their additional financial help comes from their sons. In Uzbek culture, men earn much more than women, and women are usually employed in a lower paying job in addition to their normal household chores.[30] Support from the son is usually most common after beginning to receive a pension, and although support from sons is usually inadequate, most of the elderly were happy with support from their daughters. Similar situations exist in some other countries with similar family structures. The findings of Dalstra *et al.* corroborated our study data; they mentioned that after retirement, elderly people do not gain income by paid work, but only rely on pensions and some other sources.[31] If income is decreased after retirement,[32] it increases the risk of poor health.[11] Hence, income source can be used as a predictor of health among the elderly. Soong-Nang Jang *et al.*, in their study of people aged 65 or older,[28] discussed the importance of personal income, which plays an important role in successful ageing. They also found that those with a higher socio-economical status were more likely to age with few health problems.

Many international studies have addressed the problem of care for the elderly by family caregivers.[15-17] Some studies have documented the differences in caregivers between sons and daughters. In Japan, the eldest son is gradually becoming more common as an informal caregiver, accounting for 25% of actual child caregivers in 2004 compared to 20% in 2001. Most informal care is provided by daughters: 41% by daughters-in-law and 34% by daughters, compared to 25% by sons and 1% by sons-in-law among all child caregivers.[33] Also, Brodsky *et al.* found that children are a major source of support to the elderly.[2]

Informal care by adult children is still one of the characteristic sources of caregiving for elderly parents, because the family in Uzbekistan continues to play its traditional unifying role of taking care of elderly people. In our study, the majority of the caregivers were women; daughters and daughters-in-law. The elderly usually receive necessary support at home from their family members. This kind of support is apparently related to customs and traditions of the community in which they belong.

Our study design is cross-sectional in nature and it is hence difficult to establish cause-effect relationships between self-rated health and various socio-economic factors. A longitudinal study is needed to ascertain these relationships in the future. This study, however, sampled a representative cross-section of Uzbek society. Other limitations were that our sampling took into account only non-institutionalized individuals, and excluded frail elderly persons unable to be interviewed, and persons living in long-term nursing homes and hospitals because of chronic illness. Such a design may bias measurement of self-rated health towards the positive end. We consider that the same relationship between poor self-rated health and increased mortality observed worldwide is present in Uzbekistan, and that this relationship should be confirmed. Unfortunately, we were unable to extend our study to track the mortality rate of our study population. We were also