# SELF-PERCEIVED HEALTH AND ITS ASSOCIATIONS WITH SOCIAL FACTORS AND PERCEIVED ENVIRONMENTAL QUALITY IN SOUTHERN KAZAKHSTAN: A CROSS-SECTIONAL STUDY

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**Introduction:** Self-perceived health (SPH) has been shown to be a valid proxy indicator of health status in epidemiological studies. Substantial social variations in SPH have been previously reported from Kazakhstan. Southern Kazakhstan is among the poorest regions of the country with limited health information in international peer-reviewed literature.
**Aim:** The aim of this study was to assess SPH in Southern Kazakhstan and its associations with selected social factors and perceived environmental quality.
**Methods:** Altogether, 1 148 permanent residents of the Turkistan region aged 16-63 years participated in a cross-sectional study. Data on SPH, age, gender, ethnicity, marital status, education, perceived environmental quality, smoking and alcohol consumption were collected by a questionnaire. Associations between SPH and selected socio-demographic and geographical variables were assessed using multivariable logistic regression. Crude and adjusted odds ratios (OR) were calculated.
**Results:** Poor, satisfactory, good and very good SPH was reported by 4.4 %, 27.1 %, 55.3 % and 13.2 % of the participants, respectively. Men (OR = 2.11; 95 % CI: 1.53-2.89), cohabiting responders (OR = 2.37; 95 % CI: 1.30-4.35), those who perceived environmental quality as unhealthy (OR = 2.12; 95 % CI: 1.31-3.43) or satisfactory (OR = 1.75; 95 % CI: 1.16-2.66), smokers (OR = 1.64; 95 % CI: 1.02-2.64), alcohol drinkers (OR = 1.44; 95 % CI: 1.00-2.06) and residents of Ordabasinski district (OR = 1.98; 95 % CI: 1.22-3.23) were more likely to report poorer health (poor+satisfactory combined) than their counterparts in the reference categories in the final multivariable model.
**Conclusions:** The observed variations in SPH in Southern Kazakhstan contribute to the knowledge on inequalities in health in Kazakhstan and warrant monitoring of health inequalities on the national level. Further research in Southern Kazakhstan should address the factors behind the associations documented in this study.
*Key words*: Self-rated health, social inequalities, perception of environment, Kazakhstan

# СУБЪЕКТИВНАЯ ОЦЕНКА ЗДОРОВЬЯ, СВЯЗЬ С СОЦИАЛЬНЫМИ ФАКТОРАМИ И ЭКОЛОГИЧЕСКИМ БЛАГОПОЛУЧИЕМ В ЮЖНОМ КАЗАХСТАНЕ: ПОПЕРЕЧНОЕ ИССЛЕДОВАНИЕ

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**Введение.** Субъективная оценка здоровья (СОЗ) является валидным прокси-индикатором фактического здоровья и может использоваться в эпидемиологических исследованиях. Предыдущие исследования показали существенные социальные различия в СОЗ. Южный Казахстан является экономически и экологически неблагополучным регионом с ограниченной информацией о здоровье населения в международной рецензируемой литературе.
**Цель.** Изучить СОЗ населения на юге Казахстана в зависимости от социальных факторов и субъективной оценки экологического благополучия (СОЭБ).
**Методы.** 1 148 человек из четырех сельских районов и? двух городов Туркестанской области участвовали в поперечном исследовании. Данные о различных аспектах здоровья и факторах риска собирали посредством анкетирования с помощью подготовленных сотрудников учреждений здравоохранения. Для данного исследования использовали только данные о СОЗ, возрасте, поле, этнической принадлежности, семейном положении, образовании, курении, употреблении алкоголя и СОЭБ в месте проживания. Связь между признаками анализировали с помощью многомерного логистического регрессионного анализа с расчетом нескорректированных и скорректированых отношений шансов (ОШ) с 95 % доверительными интервалами (ДИ).
**Результаты.** Распространенность плохой, удовлетворительной, хорошей и очень хорошей СОЗ составила 4,4 %, 27,1 % 55,3 % и 13,2 % соответственно. Мужской пол (ОШ = 2,11; 95 % ДИ: 1,53–2,89), сожительство (ОШ = 2,37; 95 % ДИ: 1,30–4,35), низкая (ОШ = 2,12; 95 % ДИ: 1,31–3,43) или удовлетворительная (ОШ = 1,75; 95 % ДИ: 1,16–2,66) оценка экологического благополучия, курение (ОШ = 1,64; 95 % ДИ: 1,02–2,64), употребление алкоголя (ОШ = 1,44; 95 % ДИ: 1,00–2,06) и проживание в Ордабасинском районе (ОШ = 1,98; 95 % ДИ: 1,22–3,23) были связаны с более низкой СОЗ.
**Выводы:** Результаты исследования дополняют предыдущие казахстанские данные о социальных различиях в показателях здоровья населения и подтверждают необходимость проведения мониторинга социального неравенства, в т. ч. и по показателям здоровья. Дальнейшие исследования в Казахстане должны быть нацелены на изучение факторов, объясняющих выявленные статистические связи.
*Ключевые слова:* самооценка здоровья, социальное неравенство, субъективная оценка экологического благополучия, Казахстан

## Introduction

Self-perceived health (SPH) is a commonly used health indicator particularly in settings with limited resources [11]. SPH has been shown to be a simple, valid and reliable tool for studying health inequalities in population-based epidemiological studies [14]. Moreover, it can be used as a simple predictor of mortality [7, 8].

SRH varies considerably both between and within countries. Moreover, strength and even directions of the associations between various factors and SPH vary between settings. Earlier studies from the transitional economies in Eastern Europe including former Soviet republics have shown that age, gender, education and material deprivation are strongly associated with SPH [4, 5, 10, 13, 18].

Environmental factors are also important predictors of individual and population health [3, 17]. Although subjective, perceived environmental quality may serve as a proxy indicator of environmental conditions [16], particularly in areas where laboratory assessments of environmental risks are not available.

Although there is an abundance of research on SPH and associated factors from both developed and developing countries, we the evidence from Central Asia is scarce. Kazakhstan is the second largest country of the former Soviet Union and is among the most rapidly growing economies in Central Asia. The total population of Kazakhstan was 18.8 million in 2020. The GDP per capita in PPP$ increased from 6087$ in 1995 to 26252$ in 2017. Contrary to several other countries of the former Soviet republics, the level of economic inequality as estimated by Gini coefficient decreased from 39.8 in 2005 to 27.5 in 2017. Whether this economic growth and seemingly more equal income distribution was reflected by a decrease in the levels of health inequalities remains unknown.

We identified only two studies on health inequalities in Kazakhstan. The first assessed SPH in 1199 45+ years old residents of central Almaty - the former capital and the largest city in the country [1]. Age, gender, education and particularly self-reported material deprivation, but neither ethnicity nor marital status were found to be associated with SPH [1]. The second study was a part of the national household survey-2012 and included 12 560 participants. Ethnic Russians, unmarried persons, low educated people and urban residents were more likely to report poor health [20]. Heterogeneity of the of the findings warrants further research in other settings particularly in the most economically deprived areas.

Southern Kazakhstan has a population of 2 million people. It is the most densely populated region of Kazakhstan due to its mild climate, well-developed irrigation and proximity to Tashkent - the most populated city of Central Asia. It is also the fastest growing region due to high birth rates and intensive migration of workers from neighboring Uzbekistan. More than three fourths of the population are Kazakhs (76 %). Uzbeks are the main minority group accounting for 17 % of the population while ethnic Russians constitute only 1.73 % (2020). The regional capital - Turkistan - was declared as the spiritual capital of the Turkic world in 2017. At the same time, Turkistan region is the poorest region in Kazakhstan with population income level substantially below the national average.

The aim of this study was to assess SPH in Southern Kazakhstan and its associations with social factors and perceived environmental quality.

## Methods

In total, 1 148 permanent residents of 4 rural districts (Ordabasinsky, Suzaksky, Shardarinsky and Otyrarsky) and 2 towns (Arys and Turkistan - the regional capital of Southern Kazakhstan) took part in a cross-sectional study. The participants were selected at random from the lists of served residents at district healthcare facilities. A 34-item questionnaire was filled out by the participants with assistance of trained paramedical personnel at participating healthcare centers. For the purpose of this study only data on SPH, age, gender, marital status, education, place of residence, smoking, alcohol consumption, and self-perceived environmental quality were used.

After initial frequency analysis larger categories were cleated for most variables. Ethnicity was coded as Kazakh and other. By marital status the participants were divided into married, cohabiting and unmarried. The latter group also include divorced and widowed. Two categories were used for education, namely, secondary or lower and higher including incomplete higher. Daily smoking was dichotomized into yes and no. By alcohol consumption the participates were categorized into abstainers and alcohol drinkers. Self-perceived environmental quality was coded as unhealthy combining initial categories of bad and very bad, satisfactory and good.

Categorical data were presented as absolute numbers and proportions. Bivariate comparisons were performed using Pearson's chi-squared tests. Exact tests were applied where appropriate. Independent associations between SPH and selected factors were assessed by multivariable logistic regression with and without adjustment for all above-mentioned variables. All variables were included in the model as categorical data while age was used as continuous variable. SPH was used as a dichotomous outcome. Poor and satisfactory SPH were merged into one category (poorer SPH), and so were good and very good health (better SPH). Crude and adjusted odds ratios (OR) with 95 % confidence intervals (CI) were calculated. All analyses were performed using SPSS software, v.17 (SPSS Inc., Chicago, IL).

The study was approved by the ethical committee at the Khoja Akhmet Yassawi International Kazakh-Turkish University.

## Results

The age of the participants ranged from 16 to 63 years. Men comprised 45.6 % of the sample. The overwhelming majority were ethnic Kazakhs. The initial aim

**Sample characteristics and distribution of self-perceived health across selected social- and environmental characteristics in Southern Kazakhstan**

| Variable | N | % | Self-perceived health, % | | | | P |
|---|---|---|---|---|---|---|---|
| | | | Very good | Good | Satisfactory | Poor | |
| Gender | | | | | | | <0.001 |
| Male | 523 | 45.6 | 11.1 | 61.4 | 22.2 | 5.4 | |
| Female | 625 | 54.4 | 15.0 | 50.2 | 31.2 | 3.5 | |
| Ethnicity | | | | | | | <0.001 |
| Kazakh | 1125 | 98.0 | 13.5 | 55.4 | 27.4 | 4.0 | |
| Other | 23 | 2.0 | 13.0 | 52.2 | 13.0 | 21.7 | |
| Marital status | | | | | | | <0.001 |
| Married | 944 | 82.2 | 11.9 | 58.1 | 27.0 | 3.1 | |
| Unmarried | 143 | 12.5 | 21.7 | 47.6 | 23.1 | 7.7 | |
| Cohabiting | 61 | 5.3 | 14.8 | 31.1 | 37.7 | 16.4 | |
| Education | | | | | | | 0.030 |
| Secondary or lower | 621 | 54.1 | 13.5 | 51.7 | 29.5 | 5.3 | |
| Higher or incomplete higher | 527 | 45.9 | 12.9 | 59.6 | 24.3 | 3.2 | |
| Self-perceived environment | | | | | | | <0.001 |
| Unhealthy | 279 | 24.3 | 10.0 | 54.8 | 30.8 | 4.3 | |
| Satisfactory | 649 | 56.5 | 12.2 | 56.9 | 27.7 | 3.2 | |
| Good | 220 | 19.2 | 20.5 | 51.4 | 20.5 | 7.7 | |
| Daily smoking | | | | | | | 0.008 |
| Yes | 120 | 10.5 | 9.2 | 48.3 | 33.3 | 9.2 | |
| No | 1028 | 89.5 | 13.7 | 56.1 | 26.4 | 3.8 | |
| Alcohol consumption | | | | | | | <0.001 |
| Yes | 270 | 23.5 | 7.8 | 52.2 | 34.1 | 5.9 | |
| No | 878 | 76.5 | 14.9 | 56.3 | 24.9 | 3.9 | |
| Residence | | | | | | | <0.001 |
| Ordabasinski district | 201 | 17.5 | 10.0 | 42.8 | 28.4 | 18.9 | |
| Suzaksky district | 199 | 17.3 | 19.1 | 56.3 | 21.6 | 3.0 | |
| Shardarinsky district | 203 | 17.7 | 31.5 | 44.3 | 22.7 | 1.5 | |
| Arys | 197 | 17.2 | 14.7 | 56.9 | 26.9 | 1.5 | |
| Otyrarsky district | 130 | 11.3 | 0.8 | 63.8 | 35.4 | 0.0 | |
| Turkestan | 218 | 19.0 | 0.0 | 69.7 | 30.3 | 0.0 | |
| Total | 1148 | 100.0 | 13.2 | 55.3 | 27.1 | 4.4 | |

was to study 200 individuals from the selected settings. The final sample consisted of relatively equal numbers of participants from all locations except Otyrarsky district where only 130 individuals agreed to participate. More than a half of the sample had secondary or lower education. Most of the participants were married while only 5.3 % were co-habiting. Daily smoking was reported by 10.5 % of responders. More than three thirds of the participants reported to abstain from alcohol. Only 0.2 % reported that they consumed alcohol once a week or more often. Therefore, all categories of alcohol consumption were merged into two: yes and no. Only 19.2 % of the sample considered their environment as good or healthy while 56.5 % reported it to be satisfactory. At the same time, 24.3 % of the responders perceived the quality of their environment as either bad (7.6 %) or worse than satisfactory (16.7 %). To avoid small numbers these two categories were merged into one group titled unhealthy. All basic characteristics of the sample are presented in Table 1.

In total, very good, good, satisfactory and poor SPH was reported by 13.2 %, 55.3 %, 27.1 % and 4.4 % of the participants, respectively. Bivariate analysis has shown significant associations between all studied factors and SPH with four categories (Table 2). Men were less likely to assess their health as good or very good than women. Ethnicity was also associated with the outcome. As many as 21.7 % of non-Kazakhs reported their health as poor compared to only 4.0 % of ethnic Kazakhs. Unmarried participants were more likely to report very good health while the proportion of cohabiting participants with poor SPH was more than 5 times as high as among their married counterparts. Better educated individuals, non-smokers and non-drinkers were more likely to report better SPH. Significant variations in SPH were also observed between settings with the greatest proportion of poor SPH to be reported in Ordybasinski district. The greatest proportion of good SPH was reported in Turkistan - the regional capital. People who perceived their environment as good were

*Table 2*

**Crude and adjusted odds ratios (OR) with 95 % confidence intervals (CI) for the associations between poor or satisfactory
self-perceived health and selected social- and environmental characteristics in Southern Kazakhstan**

| Variable | Crude OR | 95 % CI | P | Adjusted OR | 95 % CI | P |
|---|---|---|---|---|---|---|
| Gender | | | 0.009 | | | <0.001 |
|   Male | 1.40 | 1.09-1.80 | | 2.11 | 1.53-2.89 | |
|   Female | 1 | Reference | | 1 | Reference | |
| Ethnicity | | | 0.728 | | | 0.622 |
|   Kazakh | 1 | Reference | | 1 | Reference | |
|   Other | 1.17 | 0.49-2.78 | | 1.27 | 0.49-3.34 | |
| Marital status | | | <0.001 | | | 0.012 |
|   Married | 1 | Reference | | 1 | Reference | |
|   Unmarried | 1.03 | 0.71-1.51 | | 1.35 | 0.87-2.08 | |
|   Cohabiting | 2.74 | 1.62-4.62 | | 2.37 | 1.30-4.35 | |
| Education | | | 0.008 | | | 0.438 |
|   Secondary or lower | 1.41 | 1.09-1.81 | | 1.12 | 0.84-1.48 | |
|   Higher or incomplete higher | 1 | Reference | | 1 | Reference | |
| Self-perceived environment | | | 0.235 | | | 0.008 |
|   Unhealthy | 1.38 | 0.94-2.02 | | 2.12 | 1.31-3.43 | |
|   Satisfactory | 1.14 | 0.82-1.60 | | 1.75 | 1.16-2.66 | |
|   Good | 1 | Reference | | 1 | Reference | |
| Daily smoking | | | 0.006 | | | 0.041 |
|   Yes | 1.71 | 1.16-2.52 | | 1.64 | 1.02-2.64 | |
|   No | 1 | Reference | | 1 | Reference | |
| Alcohol consumption | | | <0.001 | | | 0.049 |
|   Yes | 1.65 | 1.24-2.19 | | 1.44 | 1.00-2.06 | |
|   No | 1 | Reference | | 1 | Reference | |
| Residence | | | <0.001 | | | 0.003 |
|   Ordabasinski district | 2.06 | 1.38-3.08 | | 1.98 | 1.22-3.23 | |
|   Suzaksky district | 0.72 | 0.49-1.16 | | 0.88 | 0.56-1.39 | |
|   Shardarinsky district | 0.73 | 0.48-1.13 | | 0.74 | 0.47-1.19 | |
|   Arys | 0.92 | 0.60-1.40 | | 1.01 | 0.63-1.62 | |
|   Otyrarsky district | 1.26 | 0.80-2.00 | | 1.18 | 0.72-1.98 | |
|   Turkestan | 1 | Reference | | 1 | Reference | |
| Age | 1.05 | 1.04-1.06 | <0.001 | 1.05 | 1.04-1.06 | <0.001 |

twice as likely to report good health as those who perceived their environment as unhealthy.

Male gender, co-habiting, perceiving the environment as unhealthy or satisfactory, smoking, alcohol and residence in Ordabasinski district were associated with poorer SPH in the final logistic regression model with adjustment for all variables and age as continuous variable.

## Discussion

This is one of the few papers presenting information on social and geographic variations in SPH in Southern Kazakhstan. Moreover, found significant associations between perceived environmental quality and SPH were observed.

The overall prevalence of poor health was 4.4 %, which is slightly lower than as observed in the national household health survey in 2012 [20] and considerably lower than reported from Almaty [1]. At the same time, in Ordabasinski district nearly every fifth participant re-

ported poor health which should raise awareness among health authorities at different levels. One should notice that in two of the locations, the participants did not use the more extreme categories, which could be partly explained either the influence of the medical personnel assisting the participants to fill out the questionnaires. Therefore, for the final regression model we merged poor and satisfactory categories as well as good and very good in order to address this problem. In the final model, only residents from Ordabasinsky district appeared to have worse SPH, but no other geographical variations in SPH were found.

As most other researchers we observed significant associations between gender and SPH [9]. However, contrary to the evidence from Kazakhstan and other former Soviet republics men were more likely than women to report poorer health in the Turkistan region. This association became even more pronounced when all studied variables were included in the multivariable model. In stratified analysis, as many as 27 % of men

from Ordabasinsky district reported poor health. We hypothesize that this may be associated with some occupations hazards which were not assessed in this study and require further research.

Ethnic variations in health have been reported from several countries [12]. Russian minority in Kazakhstan has been reported to have poorer SPH [20] on the national level, but not in Almaty where ethnic Russians constitute a significant proportion of the population. In Southern Kazakhstan the main minority group are Uzbeks who are culturally close to Kazakhs. This may partly explain no differences in SPH by ethnic background in this study. However, the proportion of other ethnicities combined in this study was much lower than in general population of Southern Kazakhstan warranting cautious interpretation of this finding.

Unmarried individuals have been reported to have poorer health [20] in Kazakhstan, although this was not a universal finding across all post-communist countries [1, 5, 6]. In this study we found increased odds for poorer SPH in both single and co-habiting responders, but the differences reached the level of statistical significance only for the latter, which should be researched in greater detail together with social scientists.

We failed to observe significant associations between education and SPH in multivariable analysis. At the same time the proportion of responders with secondary or lower education in this study was considerably higher than in other studies from Kazakhstan, Russia or Ukraine where education together with material deprivation were among the most important correlates of SPH [4, 5, 13, 20]. It might be the case in Southern Kazakhstan that economic factors that were not included in this study were more important for SPH than education.

Smoking and alcohol are well-known determinants of both objective and subjective health [2, 5, 19]. Our findings are in line with most of the studies suggesting inverse associations between these factors and SPH. However, the prevalence of smoking in this study was only 10.5 %, which is substantially lower than expected.

Self-perceived environmental quality has not been previously studied in Kazakhstan in relation to SPH. Although subjective, this variable may reflect the existing environmental hazards that are not documented otherwise. International studies have consistently shown associations between perception of environment in general, environmental hazards, social environment, built environment etc. and different health indications [15-17]. In our paper the meaning of self-perceived environment was related mostly to environmental hazards or ecological risks. The fact that nearly every fourth respondent considered his/her environment as unhealthy should raise serious concern. Less than 20 % of the study participants perceived their environment as good. Surprisingly, in the district with the greatest proportion of poor SPH the proportion of responders who perceived their environment as unhealthy was the lowest (6.3 %) compared with 47.7 % of responders from the town of Arys. Interestingly, only 4.1 % of the respondents from Turkistan - the regional capital with virtually no industry - perceived their environment as good. Given that the perception of environmental hazards greatly depends on information provided by mass media, health- and environmental literacy as well as the objective situation, further research including objective measurements of environmental and probably occupational hazards is warranted in the region.

The results of the study should be interpreted cautiously taking into account its potential limitations. The main limitations are related to the cross-sectional research design [6].

Another limitation of the study is inclusion of 4 rural districts and only two urban settings. Although the districts were selected at random, they appear to over-represent ecologically challenged areas. This may lead to underestimation of the overall level of SPH. All data in this study ae based on self-reports and a prone to information bias social desirability bias which is reflected by low prevalence of smoking and alcohol consumption compared to the national data. However, the majority of the population of Southern Kazakhstan are practicing Muslims. Thus, low levels of alcohol consumption are not surprising. Another limitation is that the data were collected in different districts with assistance of different medical assistants. This may explain the fact that in two locations the most extreme categories of SPH were rarely used. This limitation was addressed in logistic regression when SPH was dichotomized into better SPH and poorer SPH consisting of a few initial categories each. Relatively small sample size is another limitation associated with insufficient power to detect small effects which however may be of limited value for public health professionals.

Despite these limitations, we documented slightly lower proportion of residents with poor SPH in the Turkistan region compared to earlier reports from Kazakhstan. Moreover, we identified age, gender, marital status, but not education or ethnic background as correlates of SPH in the region. Associations between SPH and self-perceived environmental quality has not been previously studied in Kazakhstan and should be replicated in other settings preferably with the use of objective measurements of environmental and occupational hazards. Further research in Southern Kazakhstan should also address the factors behind the associations documented in this study.

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