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SUBJECTIVE ASSESSMENT AND PERCEPTION OF HEALTH RISKS BY DIFFERENT POPULATION GROUPS

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In order to study the differences in understanding health risks, we surveyed 695 people aged 18 and above residing in the town of Novodvinsk. We determined that the respondents under 30 tend to exaggerate the risk of environmental pollution as compared to the group aged 45. The respondents with a higher educational degree and non-manual workers typically consider lifestyle factors to be of higher risk as compared to those with no higher education manual workers. The respondents with a secondary vocational education degree and manual workers consider radioactive environmental pollution to be of a higher health risk. The respondents of average and lower income consider poor lifestyle to be of higher risk as compared to the respondents of higher income.

Key words: *understanding health risks.*

Introduction. Understanding of the risk mainly depends on the transfer and distribution of the information about risk. Transferring information about risk is a two-way process with an active participation of those who transfer it and those who receive it [4, 10]. An important contribution to the theory of risk understanding was made by geographical, sociological, political, anthropological, and psychological studies. Recently, there has been more interest to the transferring and perceiving of information about risk in public and private sectors, as well as in the academic literature.

The first and biggest contribution to the study of risk perception was the psychological studies conducted in 1950-1960s [5]. The studies by Ch. Starr were fundamental in shaping the concept of risk perception [7, 8, 9]. Those studies were important because the researcher focused on the acceptability of risk based on a compromise between risks and benefit both on public and individual levels. The main idea is that people experience bigger aversion of highly hazardous though unlikely events as compared to those that are common and frequent. P. Solvic [6] reviewed the works of Starr on the basis of a 'psychometric' approach and developed a model called 'psychometric paradigm'. In this model, public risk is evaluated and reflected as a mean value of expressed preferences by ranking hazards on a scale. The use of psychometric scales allows for the comparison of risk perception by different people. But according to many researchers [11], the psychometric approach underestimates the impact of sociocultural factors on risk perception.

In recent years, there have been several studies of the perception by different population groups of various risks as well as the assessment of the willingness to pay for the lowering or removal of hazardous or confounding factors (presence of noise, attractive or foreign odors, etc.), assessment of the cost of statistical life and one year of the added life [1, 2, 3].

The purpose of this research is to study the characteristics of health risk perception by different population groups depending on gender, age, education, employment and income in an industrial town of Novodvinsk.

Research methods. The characteristics of risk perception were studied based on a cross-sectional

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study. We surveyed 695 people aged 18 and up residing in Novodvinsk. The town's biggest industrial enterprise is Arkhangelsk Self-Contained Paper Mill. We used a questionnaire drafted by the Scientific Research Institution of Human Ecology and Environmental Hygiene named after A.N. Sysin. We ranked the nine risk factor groups in order to determine the most hazardous one. We compared the perception of high risk factors among different age groups depending on the socio-demographic and economic characteristics of the respondents. The categorical variables are presented in the form of percentage ratio and their 95% confidence interval (95% CI). The testing of the hypothesis that there was no difference in perception of risk among different population groups was conducted with the help of χ^2criterion. The level of significance at which the null hypothesis was rejected equaled 0.05. The statistical data analysis was conducted with the use of SPSS 18.0 software for Windows and EpiInfo 3.4.1.

Results of the study and their explanation. The average age of the respondents was 35 (95% CI: 34.56–35.82). The analysis of the educationl level showed that 11.7% (81) of the respondents received only secondary education, 57.1% (392) – vocational secondary education, and 31.0% (213) – higher education. It was determined that 47.1% (327) of the respondents fell under the category 'workers', 43.7% (304) were qualified specialists with a higher educational degree, and 8.1% (56) were unemployed (pensioners, housewives, unemployed).

The figure below shows that the bulk of the respondents consider radioactive environmental pollution (92.2%; 95% CI: 89.7–94.6), chemical pollution (91.6%; 95% CI: 88.9–94.3) and microorganisms (74.6%; 95% CI: 70.6–78.6) to be the biggest health hazard while 79.4% (95% CI: 75.5–83.2) of the respondents consider physical factors to be the least hazardous. It is possible that the priority of factors from the environmental pollution group, in the respondents' opinion, is connected to the fact that according to the same survey, 91.1% (95% CI: 88.9–93.2) of the respondents suppose that they are currently living in a polluted area. Emergency situations (45.8%; 95% CI: 41.0–50.5), quality of life (45.5%; 95% CI: 40.7–50.2), lifestyle (46.5%; 95% CI: 41.8–51.2) and genetic factors (61.9%; 95% CI: 57.3–66.5) are perceived by most respondents as average risk. The residents of Novodvinsk consider accidents at nuclear power plants to be the biggest risk factor. More than half of the respondents (66.7%; 95% CI: 61.19–71.15) put accidents at nuclear power plants at the top of the list of the most dangerous emergencies. In the category 'quality of life', respondents consider workplace conditions as the biggest risk factor 43.3% (95% CI: 39.37–48.83) of the respondents consider hazardous industrial factors as the biggest health risk. Among lifestyle factors, the biggest health risks for the residents of Novodvinsk are associated with drug use. The majority of the respondents (83.3%; 95% CI: 79.73–86.79) put drugs in the first place among negative lifestyle factors. In the group of genetic factors, the biggest concern is associated with hereditary cancer. Half of the respondents (54.5%; 95% CI: 50.09–59.77) put hereditary cancer loading at the top of the list among other diseases.

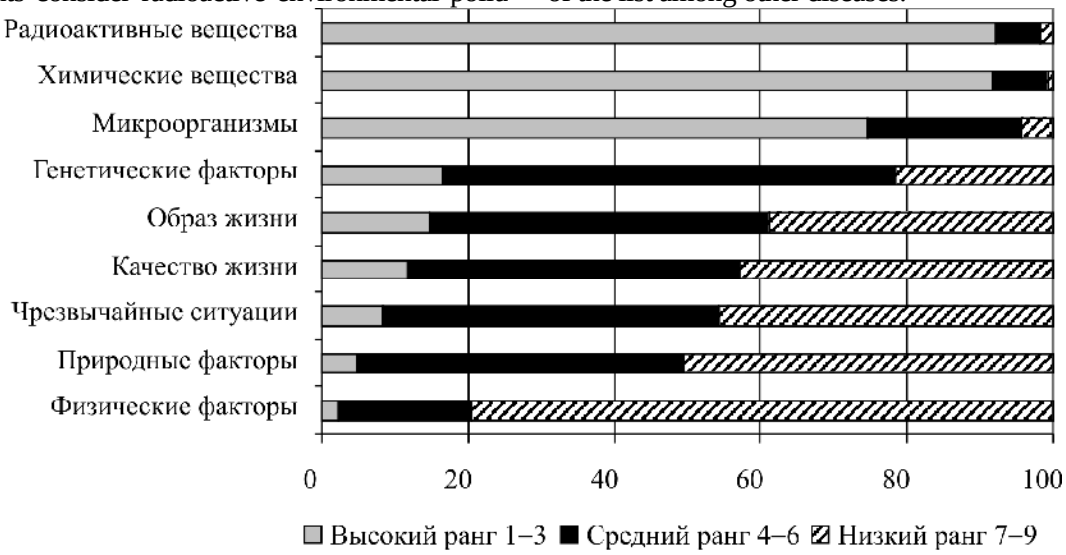

Figure. Distribution of the risk group factors as seen by the residents of Novodvinsk, %

The share of women who consider quality of life, chemical and microbiological pollution and genetic factors as high risk factors is 2.3-6.6% as compared to men (Figure 1). The relative weight of men who consider physiological factors, emergency situations, radioactive pollution and natural

and climatic factors to be the most dangerous is by 2.4-13.6% higher as compared to women. However the detected differences in the ranking of the risk factors between men and women are not statistically significant.

The relative weight of the middle-age and old-age population (45 and up) who consider lifestyle (20.5%) and quality of life (14.3%) to be high risk factors as well as emergency situation (10%) is higher than the relative weight of the population under 30 by 1.2-5% (Table 1), but these differences are not statistically significant. The share of the respondents in the age group 18-30 who believe that chemical pollution presents the highest risk is 10% statistically significantly higher as compared to the share of the population above 45.

The relative weight of the respondents with a higher educational degree who consider lifestyle factors (19.9%) to be of high risk is 9.2% bigger than the relative weight of the respondents with a specialized degree. The share of the people with a specialized vocational degree who believe that emergencies (12.2%) and radioactive pollution (94.0%) is by 7.0% and 5.0% statistically significantly higher as compared to the people with a higher educational degree (5.2% and 89% respectively).

The relative weight of the office workers who consider genetic factors (20.7%) and lifestyle (18.2%) to be high risk factors is by 8.7% and 8.5% higher as compared to manual workers; these detected differences are statistically significant. The share of the manual workers who consider radioactive (95.5%) and chemical pollution (96.1%) to be high risk factors is 5.8% and 7.3% higher than the share of the office workers.

The analysis of the differences in perception of high risk depending on the level of income showed that the share of people with average and low income who think that low quality of life and low well-being (15.8%) are high risk factors is by 11.7% statistically significantly higher as compared to the share of people with high income (4.1%).

Table 1

Distribution of high risk factors by the respondents depending on socio-demographic characteristics (%)

Risk factor groups	Gender		Age		Education		Job		Income (RUB./capita)	
	Men	Women	< 30	> 45	Higher	average	Office worker	Manual worker	>5000	< 5000
Radioactive substances	96,4	92,1	94,3	91,3	89,0**	94,0	89,7***	95,5	94,9	91,2
Chemical substances	86,0	92,4	91,9*	81,3	91,0	92,4	88,8****	96,1	93,8	90,6
Microorganisms	69,6	75,3	71,7	71,4	73,0	74,3	72,4	75,5	77,3	73,3
Genetic factors	14,5	16,8	17,8	16,3	19,4	15,0	20,7*	12,0	14,7	17,4
Education	18,2	14,1	15,4	20,4	19,9*	10,7	18,2**	9,7	12,2	15,8
Quality of life	5,4	11,9	11,0	14,3	12,9	10,3	12,4	9,7	4,1*	15,8
Emergency situations	14,3	7,8	8,8	10,0	5,2***	12,2	9,0	9,3	8,2	8,8
Natural and climatic factors	7,1	4,7	4,0	4,1	3,3	6,5	3,9	6,5	4,8	4,6
Physical factors	16,1	2,5	2,6	0,0	2,6	2,6	2,9	2,2	2,0	2,7

Note: Age - $^{*}\chi^2 = 4{,}97$; $p = 0{,}025$;
education - $^{*}\chi^2 = 6{,}34$, $p = 0{,}010$; $^{**}\chi^2 = 3{,}39$, $p = 0{,}050$; $^{***}\chi^2 = 5{,}43$, $p = 0{,}019$;
job - $^{*}\chi^2 = 5{,}26$, $p = 0{,}021$; $^{**}\chi^2 = 28{,}58$, $p < 0{,}001$; $^{***}\chi^2 = 5{,}03$, $p = 0{,}024$; $^{****}\chi^2 = 7{,}25$, $p = 0{,}007$;
income - $^{*}\chi^2 = 12{,}35$, $p < 0.001$.

The results of the Novodvinsk survey showed that the majority of the respondents (74%) use tap water for drinking and cooking. However half of the respondents are not satisfied with the water quality. Approximately half of the respondents are not satisfied with the quality of tap water (Table 2) and thus use additional tap water treatment methods at home (43%) such as filtering and setting-out, use bottled water (7%) or do both (15%). Despite the fact that odor (1 point) and after-taste (1 point) of tap water in Novodvinsk meet the hygienic standards, 47.2% and 64.1% of the respondents respectfully assessed those characteristics as unacceptable which indicates a difference in the subjective evaluation of those characteristics by the lab experts and consumers. Unacceptability of the organoleptic properties of the tap water used in Novodvinsk may be the reason why half of the respondents (54%) see a connection between their wellness and environmental pollution. 70% of them believe that contaminated tap water is the cause of sickness.

Table 2

Subjective evaluation of the quality of tap water by Novodvinsk residents

Properties	Good quality			Bad quality		
	%	95% CI		%	95% CI	
		low	high		low	High
Odor	48,1 (334)	44,3	51,7	47,2 (323)	42,8	50,2
Color	44,7 (311)	41,1	48,5	49,6 (345)	45,9	53,4
Muddiness	44,6 (310)	40,9	48,3	50,1 (348)	46,4	53,8
Aftertaste	32,2 (224)	28,8	35,7	64,2 (434)	58,9	66,1

Almost 90% of the respondents complained about strange odor in the atmospheric air; 70% of the respondents indicated that the odor impacts their health and well-being. Among those who responded positively to the question about a negative impact of the strange air odor on their health, 10% of the respondents see a connection with sickness and choking, 25% believe that is causes headaches, and 17% believe that bad odor makes them irritated. The analysis of the willingness to pay under the impact of hazardous factors showed that the respondents in Novodvinsk who have a negative opinion about a concrete risk factor are not willing to buy an apartment at no presented risk level.

It is worth noting that 87.1% (95%CI: 84.5–89.7) of the respondents in Novodvinsk do not know or have no answer to the question about the preventative measures that the local government take in order to reduce the impact of the risk factors on health. They also responded negatively or had no answer to the question whether those measures were effective. The respondents were asked a question: "Which areas should the government focus at in order to improve the well-being of the population of Novodvinsk?" 50% of the respondents believe that the government should focus on environmental issues. Among the priorities of environmental policy, from the public point of view, efforts should be aimed at reducing the air pollution caused by the emission of the pulp-and-paper mill (24%) and improving the quality of drinking water (20%).

Conclusion. Thus, Novodvinsk population believes that the biggest risk factors are associated with environmental pollution. At the same time, perception of the risks depends on the demographic and socio-economic characteristics of the respondents. Young people with a specialized vocational degree, workers, with a high income, are more likely to consider different types of pollution to be a high risk factor, and the quality of life and lifestyle - a low risk factor. Middle-age and old-age population with a higher education degree, office workers, with a low income mostly consider the quality of life and lifestyle to be high risk factors.

As a result, it is necessary to pay more attention to the distribution of information about risk factors and their consequences, choice of the sources of information and its type, means of distributing information and its format, target groups (specialists, politicians, general public, mass media, etc.) for which this information is aimed, and evaluation of the level of information susceptibility.

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