



## Research article

**ASSESSMENT OF HEALTH RISKS BY WORKING POPULATION AS A FACTOR IN CHOOSING A STRATEGY FOR SELF-PRESERVATION****S.Yu. Sharypova, M.D. Kornilitsyna**

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*The article has aimed to identify and classify behavioral risk-associated strategies of self-preservation among adult working population in urban areas in Russia, perception of health risks taken into account. The research object is represented by people aged 18–68 years who live in three Russian cities with their population beyond 1 million. The empirical basis of the study is quantitative (the method was formalized questionnaire;  $n = 300$ ) and qualitative data (the method was in-depth interview;  $n = 17$ ), which have been collected and analyzed within the framework of a mixed methodology per the "additional coverage" type.*

*Four groups of health risk factors have been studied: living conditions, sanitary and epidemiological, social and natural ones. Health risks have been subjectively assessed by the respondents as a combination of likelihood of negative events and their severity (each indicator was estimated with the range between 0 and 1). Social risk factors (criminal and illegal actions of other people, traffic accidents, terrorist attacks and military actions) have been revealed to be perceived by Russians as the most hazardous to health. Sanitary-epidemiological risks are ranked the second per their significance.*

*The study identifies specific types of individual self-preservation based on the intention either to reduce risk or avoid it and on the nature of actions (active or passive): acting, avoiding, waiting and adapting. Quantitative data have shown the share of "active" is significantly lower among Russians than that of "passive" (on average 25 % versus 75 %). Passive behavior is caused not only by a low level of knowledge about risks and ways to minimize them but also by Russians not being interested in solving these issues, the desire to shift responsibility for risk management to others (even if they distrust their strengths and capabilities).*

*It seems advisable to develop and implement a strategy aimed at preventing and controlling health risks, monitoring of subjective risk perception and using its results to raise people's awareness about potential hazards. Rosпотребнадзор, within implementing its functions and powers, should provide comprehensive communication about sanitary-epidemiological and other health risks, group and individual ways and methods to minimize them; this communication should be widely available and easily understood per both its form and contents. This will make for correct choice on self-preservation strategies and, consequently, health promotion among the country population.*

**Keywords:** health risk, risk assessment, risk perception, living conditions, sanitary and epidemiological factors, social factors, natural factors, risk management strategies.

Health risk assessment and management is a key trend in healthcare science and policy and in providing sanitary-epidemiological safety of the country population [1]. Health risk identification makes it possible not only to capture potential threats but also to get an insight into their realization as well as possible ways to minimize them. Risk perception and adequate risk assessment create social attitudes associated with individual health-related deci-

sions and specific health-protective behaviors [2, 3].

In the current socioeconomic conditions, special attention is paid to health and self-protective behavior of the employable population. This is extremely relevant considering the actual strategic goals and tasks set in the Russian Federation within the state demographic and economic strategies [4, 5]. Literature analysis established that the major focus of

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attention in studies devoted to health risks for workers was on occupational factors (especially unsafe working conditions, including occupational hazards and hard work)<sup>1</sup> [6–8], environmental pollution [9, 10]; psychological and social factors able to induce stress and emotional strain [11–13]. Some studies investigate such behavioral (internal) health risk factors as smoking, alcohol use, low physical activity, social and psychological issues, and neglect of periodical medical check-ups [14–16]. In other studies, special emphasis is placed on the ‘background’ for formation of health risks for workers including sanitary-hygienic and socioeconomic conditions as well as the current state of health typical for residents of a given region [17, 18].

Overall, multiple studies give evidence that health of working population is influenced not only by working conditions but also by many other routine factors and threats, which should be given more attention and thought. By now, a certain ground has been created for getting an insight into a complicated picture of working population’s health being determined by environmental conditions, housing, a possibility to catch a communicable disease and some other threats. Preservation of the country labor resources requires considerable efforts aimed at mitigating and minimizing health risks. However, it is important to understand that risk minimization is possible only if we consider both its objective (that is, actually considered and calculable risks) and subjective (that is, risk perception and assessment by specific people) components.

The objective component in health risk assessment is based on establishing likelihood of negative consequences; it reflects actual phenomena, processes and aspects of people’s life activities [19]. The subjective component in risk assessment, which is in the main focus of the present article, is based on a social attitude influencing estimations of possible losses or benefits and combining monitoring of likelihood of a negative event and severity of its

consequences in human mind [20]. In Russian and foreign practice, the level of risk acceptability is, as a rule, determined as low, not higher than a habitual level typical for everyday life. A moderate risk is also determined, which is above the low risk but is not within the critical range; a high level risk is a risk that requires special attention and immediate action. Likelihood of a negative effect can be ‘very low’ meaning that this event is practically sure to never happen; ‘low’ (not above the habitual level) meaning that an event is typical and rarely happens; ‘medium / moderate’ is above the low level but is not within the critical range (approximately 50 %); ‘high’ meaning that the event is very likely to happen; ‘extremely high’ meaning the event is almost surely to happen [1, 5, 19].

When people do not wish to bear with risk, they activate their behavioral resources by asking for help from relevant authorities and other responsible persons in places of residence, using personal protection (both physical things such as face masks and actions such as closing windows and doors). In case of emergency, people are often ready to migrate from a habitual environment into a new, more favorable one [21]. However, the cognitive and behavioral components might have no connections. The foregoing study that focused on investigating risk perception by industrial workers found either no or very weak relationship between high subjective hazard assessment and adherence to self-protective behaviors [21]. People from the analyzed group were shown to overestimate influence of environmental and occupational factors but to underestimate significance of their individual behaviors. Multiplicity of daily routine contexts associated with both personal traits and sociocultural factors creates differences in approaches to overcoming potential health threats.

Individual strategies for health risk management that can be found in research literature are quite diverse. Experts in psychology

<sup>1</sup> Koshurnikova N.A., Nifatov A.P. Rak legkogo u rabotnikov plutoniyevoogo proizvodstva [Lung cancer in workers of plutonium production]. *Radiatsiya i risk (Byulleten' NRER)*, 1995, no. 5, pp. 123–128 (in Russian).

describe strategies based on the emotional component, which is an individual's mental state in case of a risk (threat or danger). It can be adequate (corresponding to a situation), alerting (danger is exaggerated), ignoring (danger is underestimated) and uncertain (involving various actions) [22]. Sociologists investigate individual strategies for health risk management through specific behaviors. Such behavioral practices can mostly be located within the continuum from responsible self-protective behavior to risky one. Thus, a Russian study focused on industrial workers and used quantitative indicators that described specific health-related behaviors (diet, smoking, alcohol use, medical and physical activity). As a result, it established three specific behavior types with various levels of risks involved, namely, low, medium, and high [23]. Another Russian study was accomplished on a sample made of employable people and considered the same behaviors; as a result, five health-related behavioral models were outlined: highly interested, moderately interested, inconsistent, passive, and destructive [24].

However, certain limitations appear when self-protective strategies are investigated only through implementation of individual health-protecting strategies. Individuals are assumed to determine their health behavior relaying on the 'risk – effect' relationship. At the same time, this relationship cannot be obvious in all cases, especially when environmental factors are involved, and not for all individuals; therefore, implementation of specific behaviors does not always mean an effective decrease in risk burden [25]. To avoid this limitation, foreign experts suggest two opposite health-related strategies based on risk assessment: risk minimization and risk avoidance [26].

It is important to remember that there are different strategies aimed at mitigating health risks separately for different environmental risk factors. In a situation when epidemiological threats are serious, just as it was during the COVID-19 pandemic, individuals implemented one of three strategies to mitigate risks of infection: 1) maximum protection strategy

(following most recommendations); 2) dominant protection strategy (following basic recommendations); 3) mixed strategy (following some recommendations and simultaneous risky behaviors) [27]. In case of health risks, which are associated with criminal and illegal actions taken by others, several strategies can be outlined including avoidance (creation of a protected space), negotiations (interaction with an aggressive environment using verbal visual-emotional forms), and actions (attack, force interaction with an aggressive environment) [28]. Other strategies are usually pursued in a situation when a health risk is associated with a terrorist threat: looking for information, alertness, and habituation [29].

Therefore, since any state is interested in protecting and improving health of its employable population, a necessity arises to investigate various health risks and relevant behavioral risk-associated strategies, which can be useful for developing adequate healthcare policies.

**In this study, we aimed** to analyze subjective risk assessment by working population in Russia as regards various health factors and examine people's behavior concerning health risks.

**Materials and methods.** The empirical study was conducted using a mixed methodology, which involves collecting and analyzing data following two sociological traditions (qualitative and quantitative). The methods were integrated as per 'additional coverage' type (quant + qual)<sup>[30]</sup>.

Quantitative data were obtained by using a formalized survey conducted in 2024 in a sample made of employed people aged between 18 and 65 years ( $n = 300$ ). The survey took place in three large cities in Russia: Perm, Nizhniy Novgorod, and Novosibirsk. The preliminary stage in data analysis involved weighing the samples per the 'sex' parameter (weighing was based on the men-to-women ratio in Russian cities). The subsequent analysis was performed taking the weight coefficients into account. The sample structure is provided in Table 1.

Table 1

## The structure of the analyzed sample

| Parameter                             |                                           | Number (people) | Proportion (%) |
|---------------------------------------|-------------------------------------------|-----------------|----------------|
| Sex                                   | Men                                       | 138             | 46             |
|                                       | Women                                     | 162             | 54             |
| Education                             | Secondary school                          | 13              | 5              |
|                                       | Vocational or unfinished higher education | 60              | 20             |
|                                       | Higher                                    | 225             | 75             |
| Income level*                         | Low                                       | 126             | 43             |
|                                       | Medium                                    | 142             | 49             |
|                                       | High                                      | 24              | 8              |
| Having a partner                      | Yes                                       | 212             | 71             |
|                                       | No                                        | 87              | 29             |
| Having children younger than 16 years | Yes                                       | 127             | 42             |
|                                       | No                                        | 173             | 58             |

Note: \*The income level was measured by subjective estimates using the following question: 'Please state, which description suits your financial position the most'. Low level corresponded to the following answers: sometimes I don't have enough money to buy food / I have enough money to buy food but clothing is less affordable / I can buy food or clothing but buying some durable things (furniture, electronics, or household appliances) is an issue. Medium income is when people can afford durable goods but have no money for expensive purchases (apartment, car, etc.). High income means a person can buy some expensive things (apartment, car, etc.).

Official employment in leading branches of the economy was the basic criterion in selecting the study participants; their occupations included those with high work intensity. The study sample included heads of companies or structural divisions (21 %); specialists (59 %); support, technical and servicing staff (13 %); private entrepreneurs, self-employed and freelancers (7 %). The sample was made up of people involved in material production (light and heavy industry, 15 %; construction, 7 %) and in social and cultural activities (including education and science, 26 %; public authorities and law enforcement agencies, 6 %). Most respondents said they had full-time job and a permanent workplace (76 %); still, some worked remotely (12 %), in shifts (2 %) or had to constantly travel for work (5 %).

Health risks for the employed respondents were assessed using the following formula:

$$R = p \cdot g,$$

where  $R$  is the level of the subjectively perceived risk,  $p$  is likelihood of negative health outcomes upon exposure to a certain risk factor,  $g$  is severity of health harm (severity of

negative health outcomes) due to impacts exerted by a certain risk factor. Perceived likelihood and severity were measured using the following questions: 'On the scale from 1 to 10, where 1 is the lowest score and 10 is the highest score, please estimate the following: 1) How likely is [a certain risk factor] to affect your health? 2) How severe can health outcomes be for you upon exposure to [a certain risk factor]?'. Several risk factors were proposed to be estimated by the respondents including 1) ambient air; 2) consumed foods; 3) consumed water; 4) housing conditions; 5) working conditions; 6) weather phenomena and natural disasters; 7) poisonous plants or hazardous animal, fish, and insect species; 8) other people's criminal and illegal actions; 9) terrorist attacks and hostilities; 10) traffic accidents. For further analysis, all scores were transferred to the range between 0 and 1.

Self-protective strategies were established based on a certain risk-related behavior. The inventory had a question (*Do you take any action to mitigate negative influence [of a certain risk factor] on your health?*), which helped divide the respondents into those who took some actions to minimize a certain health

risk and those who didn't do anything. In addition, instruments eligible for quantitative research made it possible to assess specific actions aimed at risk management as well as reasons for inactivity.

Quantitative data were analyzed using the SPSS Statistics 21.0 software package. The analysis involved using one-dimensional (descriptive statistics, odds ratio calculation and correlation analysis) and multidimensional methods (factor analysis).

Qualitative data were represented by transcripts of in-depth interviews ( $n = 17$ ), which were conducted with residents of the above-mentioned cities in Russia in 2024. The interview findings were used to supplement quantitative data and get a better insight into self-protective behaviors as regards variable health risks. The research guide included some open questions concerning risk perception and risk-related behaviors such as 'What risk factors for your health can you name?'; 'What do you think is the most serious threat for your health at the moment?'; 'What factors affect your health above all?'; 'What do you do to a) protect your health, b) feel safe, c) minimize health risks etc.?'. The open and axial coding method was employed to analyze the transcripts.

**Results.** Following the questioning results, an inverse pyramid was created to show

significance that variable health risk factors had in the employed respondents' perception (Figure 1). Among all analyzed factors, the most hazardous ones included 1) other people's criminal and illegal actions (mentioned by 67 % of the respondents), 2) traffic accidents (63 %), 3) terrorist attacks and hostilities (60 %). That was also confirmed by the interviews: 'Primarily, above all, this is about physical safety, no external threats such as an attack, roughly speaking, a threat of physical violence for me and my family ... impossibility or unwillingness to be exposed to any physical impact, either a fight, a traffic accident ... or a catastrophe' (male, 35 years old, Nizhniy Novgorod). Housing conditions were the last thing that concerned the respondents as regards their health since this factor was mentioned by only 10 % of all the participants.

Based on odds ratio calculation, some sociodemographic peculiarities were identified as regards how health risks were perceived by the respondents.

Thus, women considered several health risks factors more likely to affect them authentically more frequently than men; these factors included terrorist attacks and hostilities ( $OR = 2.055$  with 95 % CI: 1.285–3.285), weather phenomena and natural disasters ( $OR = 2.540$  with 95 % CI: 1.449–4.454),

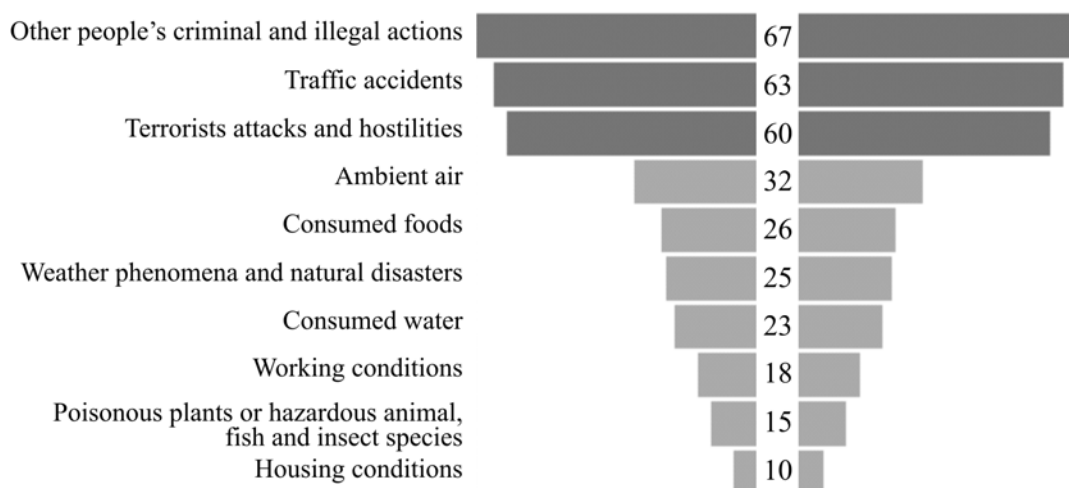


Figure 1. The inverse pyramid to show significance of variable risk factors as perceived by employed Russians (% of the respondents who mentioned the factor)

poisonous plants or hazardous animal, fish and insect species ( $OR = 3.067$  with 95 % CI: 1.489–6.318). Having a higher education was associated with higher likelihood of estimating consumed foods as a health hazard ( $OR = 2.145$  with 95 % CI: 1.085–4.240).

Traffic accidents were perceived as a health risk factor more frequently by Russians with higher incomes ( $OR = 1.652$  with 95 % CI: 1.022–2.669) and those who were married, either officially or unofficially ( $OR = 1.847$  with 95 % CI: 1.110–3.075). Notably, perception of a health risk was not age-specific according to the correlation analysis; still, some interviewed people mentioned something like '*fears come with age*'.

The foregoing risk factors were classified into groups by factor analysis (explanatory power of the model was 56 % at  $p < 0.001$ ; the Kaiser–Meyer–Olkin (KMO) test was 0.7 confirming the sample being suitable for factor analysis). The first group can be denoted as sanitary-epidemiological health risk factors, which include quality of ambient air, foods, and water. The second group comprised living conditions, that is, housing and working conditions. The third group included social risk factors associated with existence of an individual within a given society such as other people's criminal and illegal actions, terrorist attacks and hostilities, and traffic accidents. These three groups correspond to principles applied to define a factor type within the health risk analysis methodology. Natural risk factors, namely weather phenomena and natural disasters, poisonous plants or hazardous animal, fish and insect species were assigned into the fourth group.

A worker's category (per the position) was established to be associated with selecting a group of health risk factors by using the chi-square correlation coefficient. The association was obvious for the sanitary-epidemiological risk factors (Cramer's  $V = 0.247$  for ambient air at  $p < 0.001$ ; foods, Cramer's  $V = 0.254$  at  $p < 0.001$ ; water, Cramer's  $V = 0.254$  at  $p < 0.001$ ). Low- and middle-position workers were established to deem such factors as a health threat authentically more frequently than executives.

When it comes down to perceived likelihood of negative health outcomes upon exposure to the analyzed risk factors, estimated mean likelihood was considerably higher for the social health risk factors (traffic accidents, 0.69; terrorist attacks and hostilities, 0.68; other people's criminal and illegal actions, 0.66); the lowest values were obtained for the natural factors (weather phenomena and natural disasters, 0.54). Mean perceived severity of health harm turned out to be higher than mean perceived likelihood of negative health outcomes. In general, the following regularity can be traced: the higher likelihood is the higher severity is. Housing conditions are the only exclusion since, in the respondents' opinion, perceived severity of negative health outcomes due to poor housing conditions (0.55) is lower than their likelihood (0.62).

Various sociodemographic characteristics may act as predictors of 'likelihood' and 'severity'. For example, women considered several factors to more likely affect their health including ambient air pollution (Pearson's  $r = 0.272$  at  $p < 0.001$ ), water pollution (Pearson's  $r = 0.272$  at  $p < 0.001$ ), contacts with hazardous plants or animals (Pearson's  $r = -0.414$  at  $p < 0.001$ ). An association between sex and 'severity' was also traced for such factors as housing conditions (Pearson's  $r = 0.470$  at  $p < 0.001$ ).

It is interesting that age turned out to be significant only for water quality (Pearson's  $r = 0.340$  at  $p < 0.001$  for the association with likelihood; Pearson's  $r = 0.322$  at  $p < 0.001$  for the association with severity). Financial position also had some influence on how the respondents assessed likelihood of negative health outcomes as regards such social factors as other people's criminal and illegal actions (Spearman's  $\rho = -0.226$  at  $p < 0.001$ ) and traffic accidents (Spearman's  $\rho = -0.186$  at  $p < 0.001$ ). Marital status, namely, having a partner, determined assessment of likelihood as regards housing conditions (Pearson's  $r = -0.430$  at  $p < 0.001$ ) and working conditions (Pearson's  $r = -0.382$  at  $p < 0.001$ ).

Subjective risk assessment based on the product of 'likelihood' and 'severity' was interpreted in this study judging from risk

| Severity | Likelihood |      |      |      |      |      |      |      |      |     |
|----------|------------|------|------|------|------|------|------|------|------|-----|
|          | 0.1        | 0.2  | 0.3  | 0.4  | 0.5  | 0.6  | 0.7  | 0.8  | 0.9  | 1   |
| 0.1      | 0.01       | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 | 0.1 |
| 0.2      | 0.02       | 0.04 | 0.06 | 0.08 | 0.1  | 0.12 | 0.14 | 0.16 | 0.18 | 0.2 |
| 0.3      | 0.03       | 0.06 | 0.09 | 0.12 | 0.15 | 0.18 | 0.21 | 0.24 | 0.27 | 0.3 |
| 0.4      | 0.04       | 0.08 | 0.12 | 0.16 | 0.2  | 0.24 | 0.28 | 0.32 | 0.36 | 0.4 |
| 0.5      | 0.05       | 0.1  | 0.15 | 0.2  | 0.25 | 0.3  | 0.35 | 0.4  | 0.45 | 0.5 |
| 0.6      | 0.06       | 0.12 | 0.18 | 0.24 | 0.3  | 0.36 | 0.42 | 0.48 | 0.54 | 0.6 |
| 0.7      | 0.07       | 0.14 | 0.21 | 0.28 | 0.35 | 0.42 | 0.49 | 0.56 | 0.63 | 0.7 |
| 0.8      | 0.08       | 0.16 | 0.24 | 0.32 | 0.4  | 0.48 | 0.56 | 0.64 | 0.72 | 0.8 |
| 0.9      | 0.09       | 0.18 | 0.27 | 0.36 | 0.45 | 0.54 | 0.63 | 0.72 | 0.81 | 0.9 |
| 1        | 0.1        | 0.2  | 0.3  | 0.4  | 0.5  | 0.6  | 0.7  | 0.8  | 0.9  | 1   |

**Interpretation:**

High risk

Alerting risk

Permissible (acceptable) risk

Minimal risk

Figure 2. Subjective risk assessment and risk acceptability level

acceptability for a person. Acceptability was established based on the following scale: minimal risk (0.01–0.09), permissible risk (0.1–0.29), alerting risk (0.3–0.59) and high risk (0.6–1.0). To visualize the assessment results, we created a contingency table with the aim to establish individual risk values and levels of its acceptability (Figure 2).

In this study, averaged values of subjective risk perceptions were established among employed Russians; Table 2 provides the results. Social factors were considered to have the highest risk level since their values were within the 0.56–0.58 range (high risks were mentioned by 44–48 % of the respondents). Housing and working conditions had almost acceptable risk level for the respondents (0.39). Ambiguous (that is, uneven) risk assessment was discovered for sanitary-epidemiological and natural factors, especially when the assessment was sex-specific (validity of differences was confirmed by the Kruskal – Wallis test at  $p < 0.001$ ). Although women considered poisonous plants or hazardous animal, fish and insect species a serious health threat more often than men (21 % against 8 %), men thought the health risk posed by this factor to be twice as high (0.77 against 0.39). In contrast to men, women gave higher estimates to health risks

associated with drinking water (0.5 against 0.34). Russians who were employed in the tertiary sector tended to give higher estimates to risks associated with weather effects on health against those employed in material production (30 % against 11 %; *Spearman's*  $\rho = 0.303$  at  $p < 0.001$ ).

The analysis established that although subjective risk perception could be considered a factor influencing a choice on a risk-related behavior, it was not either necessary or sufficient. The correlation analysis results found no direct significant correlation between risk assessment and actions taken to minimize it. Within the discourse about forming a self-protective behavior, the respondents named feeling stable as another significant condition for choosing a strategy, which was achieved due to having relevant information about a health risk as well as due to conditions able to create a safe environment: “*Today, my work plan is clear and I do not have any overdue tasks. In general, everything is fine in our city, public transport works, Yandex cards too, the school is open. Overall, I do not feel any threats...*” (a woman, 38 years old, Nizhnii Novgorod). When being in uncertainty, without any knowledge, and having to assess risk uncontrollability, people demonstrate only the

Table 2

## Health risk assessment by employed Russians

| Groups of risk factors   |                                                               | Mean risk level |      |       | Risk acceptability level<br>(% of the respondents) |          |             |         |
|--------------------------|---------------------------------------------------------------|-----------------|------|-------|----------------------------------------------------|----------|-------------|---------|
|                          |                                                               | Total           | Men  | Women | High                                               | Alerting | Permissible | Minimal |
| Social                   | Other people's criminal and illegal actions                   | 0.56            | 0.56 | 0.55  | 44.4                                               | 34.4     | 16.1        | 4.8     |
|                          | Traffic accidents                                             | 0.58            | 0.59 | 0.58  | 48.3                                               | 38.1     | 13.4        | 0.5     |
|                          | Terrorist attacks and hostilities                             | 0.58            | 0.57 | 0.59  | 48.5                                               | 28.9     | 19.6        | 3.4     |
| Sanitary-epidemiological | Ambient air                                                   | 0.41            | 0.35 | 0.45  | 23.4                                               | 37.1     | 35.1        | 4.4     |
|                          | Consumed foods                                                | 0.45            | 0.46 | 0.44  | 31.0                                               | 34.2     | 28.7        | 6.1     |
|                          | Consumed water                                                | 0.44            | 0.34 | 0.5   | 36.5                                               | 24.2     | 23.3        | 16      |
| Living conditions        | Working conditions                                            | 0.39            | 0.40 | 0.39  | 29.1                                               | 24.7     | 34.5        | 11.8    |
|                          | Housing conditions                                            | 0.39            | 0.29 | 0.46  | 22.0                                               | 33.2     | 30.7        | 14.1    |
| Natural                  | Weather phenomena and natural disasters                       | 0.38            | 0.38 | 0.38  | 21.2                                               | 28.3     | 41.3        | 9.5     |
|                          | Poisonous plants or hazardous animal, fish and insect species | 0.48            | 0.77 | 0.39  | 39.7                                               | 23.3     | 25          | 12      |

emotional component and fail to mention the behavioral one: *"I explain that your house can fall down even if you're at home...? That is, nothing depends on you in this case. You are crossing the street when the light is green... but nobody can expect a psycho who is breaking the rules by going at the red light and can hit you. I can't help feeling alert... I feel like this all the time..."* (a woman aged 46 years, Perm). *"This is probably uncertainty. Because you don't know what can harm you, what roof an ice block or snow is going to fall down on your head..."* (a man, 52 years old, Perm).

In general, we can speak about active and passive behaviors as regards health risks. Active behaviors are based on a respondent having conscious interactions with a risky environment and taking relevant actions aimed at managing risks. Not many respondents showed themselves to adhere to such strategies, namely, one quarter on average. The proportion of active people was mostly within the range between 7 and 26 %. The respondents turned out to be active mostly as regards social risk factors, namely, traffic accidents (55 % of the respondents who selected the factor took

relevant actions to mitigate its negative influence on their health); other people's criminal and illegal actions (47 % of the respondents). The respondents took the least significant actions as regards sanitary-epidemiological and natural risks, which is consistent with their low levels in people's perception (see Table 2).

The results obtained by analyzing qualitative data showed that directions and intensity of actions aimed at managing risk was determined by different intentions. In one case, a person wanted to mitigate a risk (*"...as for personal safety: as it seems now ... complicated in general, it is vary unsafe to take a walk, for example, at night, so, I think some self-defense means are necessary"* as stated by a woman aged 20 years, Novosibirsk). Notably, this intention to mitigate a risk may be associated with not only one's own health protection but also with protecting other people's health: *"You go out and check everything ... Switch off electricity, when going out. It is also about safety, and not only yours but your neighbors as well. We live in apartment buildings and you have to think about others, not only about yourself"* (a woman, 24 years old, Perm). In other case,



a person's behavior might be aimed at avoiding risks: *"Just as any other, I'm afraid of ... drunk and aggressive people ..., it's better to avoid them ... let the police deal with them"* (a man, aged 31 years, Perm).

Actions aimed at managing various health risks were factored on the basis of the respondents' answers. Based on that, taken actions can be generalized and placed in the continuum depending on their intensity: 1) interacting actively with a risky environment (adherence to safety rules), 2) creating a safe space (use of specific protection means and examining information about health risks and ways to minimize them), and 3) deliberately avoiding a potentially risky environment.

Active interaction with a risky environment is predominantly observed as regards health risks associated with housing and working conditions. The informants stated in the interview: *"Adherence to some basic safety household rules such as switching off the stove, gas, never put a hairdryer next to the bathtub, turn off water"* (a woman, 18 years old, Perm). This behavior turned out to be the most common since almost all respondents who took actions to minimize such risks mentioned keeping an eye on the state of the electrical household appliances, water and gas supply systems (96 %); they also adhered to safety rules of using gas, water and electricity (100 %) and to safety rules at their workplace (92 %). This conclusion can explain why housing conditions were considered the least hazardous for health among all analyzed risk factors (see Figure 1).

Deliberate avoidance of a potentially risky environment was mostly used by the respondents as regards natural risk factors. Most respondents who took actions to minimize such risks stated that they tended to avoid places where a natural disaster was likely to occur (100 %) and potentially hazardous animals or plants (89 %). Only one third of the respondents in this group mentioned having specific skills necessary to manage such risks.

As for social and sanitary-epidemiological risk factors, the respondents preferred not only to interact actively with the environment but also to create a safe space. Thus, the respon-

dents stated that they studied (knew) how to behave safely in the street and in public places (91 % among those who took actions concerning social risk factors), safety rules in case of a terrorist attack or hostilities (93 %) and traffic safety rules (96 %). At the same time, they tried to adhere to safety rules when consuming foods and water; for example, 95 % minded quality of food products and 88 % consumed only bottled or boiled water for drinking.

Passive behavior is to a great extent manifested through unconscious adherence to self-preservation instincts and habitual behavioral patterns without considering or regardless of subjective risk perception. It is caused by several reasons, the most obvious one being lack of relevant knowledge, skills and (or) resources for minimizing various risks as mentioned by 30 to 88 % of the respondents in the 'passive' group. According to the questioning, Russians predominantly need knowledge and resources for securing life and health safety from negative influence exerted by ambient air pollution, terrorist attacks and hostilities (more than 80 % of the respondents mentioned that). Interestingly, during the interview, the informants tended to more often mention lack of knowledge among other people and not themselves: *"Children must be taught; everybody must be taught how to cross the street correctly [...] because neither drivers nor pedestrians know how to behave in traffic"* (a woman, 42 years old, Novosibirsk).

The second reason, also not the second in significance, is excluding oneself as a subject from health risk management and placing the responsibility on other subjects in a risky space, in particular, public authorities or other authorized services. On average, 60 % of the 'passive' respondents stated that. Largely, people tend to consider weather phenomena or natural disasters (mentioned by 91 % of the respondents), terrorist attacks or hostilities (89 %) and ambient air pollution (72 %) to be 'uncontrollable' factors. In the block named 'other', the respondents additionally stated that *"there are services to deal with it"*; *"how to make our district safe if we do not have a police officer or post here...?"*; *"this depends on the state"*. Expecting some help from institutionalized services is also traced in

the answers: *"I think it's only logical and honest to thank our special services for that, who are responsible for protecting people's safety and providing peace..., who protect us from all these disasters: that's the first. Secondly, I simply try not to think about it"* (a man, aged 35 years, Nizhnii Novgorod). At the same time, as opposed to a wish to get some help, some signs of mistrust in these subjects and doubts that they are competent enough can also be seen (*"Many people become top managers or supervisors without relevant skills, I think. It's very bad"* (a man, 44 years old, Nizhnii Novgorod)).

The third reason is lack of interest in resolving issues associated with health risk assessment and mitigation. Health risks caused by consumed foods are the least concerning for Russians as they were mentioned by 61 % of the respondents in this respect; however, the proportion of those who mentioned other risk factors is between 10 and 40 %. On one hand, this lack of interest can be explained by the existing system of values. In the survey, the respondents gave some additional comments under the heading 'other' such as *'there are much more interesting things to do at the moment'; 'because I don't have enough time to pay any attention to this aspect'*. On the other hand, this absence of involvement in health risk management can be associated with deliberate disregard of information about realized risks (*"At least, I try to protect myself from some strong negative moral feelings as regards safety"* (a man, 31 years old, Perm); *I have no wish to turn on TV and watch any news; it's better to have some general idea of what's going on, without any details... it's better to live without knowing"* (a woman, 18 years old, Nizhnii Novgorod)).

In addition to the foregoing reasons, we should consider poor awareness about health risks among the population; that is, people are not always aware what negative influence may be exerted on their health by risk factors. Therefore, they do not take any actions (*"I think it's quite possible that I simply don't know anything about that. And if I don't know about that, then it's not discussed properly in the society. Not enough information is provided [about health*

*risks]"* (man, 23 years old, Perm)). For example, the following comments were given in the survey under the heading 'other': *"I don't think about it"; "everything is fine by me"; "it does not interfere with my life"; "I hope this will not happen [a negative effect]"*.

To generalize the results obtained by the quantitative and qualitative study, we can propose the following types of individual self-protecting strategies depending on the intention (risk mitigation or risk avoidance) and actions (active or passive) taken by a person concerning health risks (Table 3). These self-protective strategies can be complementary and used depending on a situation and personal traits.

Table 3

Types of individual self-protecting strategies concerning health risks

| Intention / Actions | Active   | Passive  |
|---------------------|----------|----------|
| Risk mitigation     | Acting   | Waiting  |
| Risk avoidance      | Avoiding | Adapting |

1) 'Acting' people understand and accept the fact that health risks exist based on subjective risk perception; they take conscious highly intensive actions to minimize likelihood of negative health outcomes due to effects produced by a given factor (for example, follows the safety rules) and if a health risk has been realized, they try to minimize severity of health harm. Here's an example of such behavior from the interview: *"Yes, to a certain extent, I understand, I know what's going to happen tomorrow, which means I can influence this or that situation and what happens to me"* (a woman, aged 27 years, Nizhnii Novgorod).

2) 'Avoiding' people also understand and accept that risks exist but their subjective risk perception can overestimate actual risk levels and thereby activate the emotional component. This leads to refusal from any interactions with a risky environment. Actions within this behavioral type are aimed at avoiding any risky space as much possible (*"It is necessary to follow various safety precautions so that any extraordinary situation is prevented. For example, if an elevator is creaking, I won't take it"* (a man, aged 32 years, Perm)).

3) 'Waiting' people hope that health risks will remain unrealized (that is, their perception underestimates actual risk levels). This behavioral type is primarily manifested through following habitual self-protective behavior patterns but also involves thinking over necessary actions as regards potential risks (*"Water starts to become a concern, I'm thinking about buying some bottled one ... Well, only thoughts so far, no actions have been taken"* (a man, 44 years old, Nizhnii Novgorod). For this behavioral type, a realized risk is mitigated not due to any taken actions but by delegating the responsibility for risk management to other people: *"First of all, you should wait for something bad to happen; secondly, you should understand that in case of emergency there are people and means and you can get any necessary help"* (a woman, 38 years old, Nizhnii Novgorod).

4) And the last type is 'adapting' people. In other words, they pursue the passive adaptation strategy by denying / ignoring any information about risk realization or by trying to minimize these risks in their perception without taking any specific actions concerning them: *"I have been watching some videos... one of my favorites is 'Stop it' ... so that I could stop frightening myself, feeling scared, thinking the world is a dangerous place and threats are waiting for me at every corner. The idea is to stop doing it, to start living here and now, being exactly where I am at the moment..."* (a woman, 68 years old, Nizhnii Novgorod). A good example of such behavior is speaking about one's wish to live in a safe environment without any actions to achieve it: *"Given this situation with the ongoing war, I'd like to live in peace and not think about what is going to happen tomorrow. I wish all people around me to be kind and trustworthy, unable to betray or deceive. I wish to be protected and to have someone to rely on and to live in comfort"* (a woman, aged 34 years, Perm).

**Discussion.** According to our findings, social risk factors are the most hazardous for health. Averaged subjective levels of perception of risks associated with a person's existence in the society are within the 0.56–0.58, the maximum level being equal to 1.0. Experts

in the sphere point out that a specific risky essence typical for these factors is created by constant social changes, which cannot be controlled by a person [31]. In addition, Russians doubt that other subjects involved in a risky space can mitigate such risks, which is opposite to the position that individual risk management is determined by trust in a social system [32].

Medical and social studies employ the theory of planned behavior to explain risk-related behaviors. This theory considers subjective risk assessment to be the basic self-protection factor [33]. However, the quantitative data obtained in this study did not establish any direct significant correlation between risk perception and actions taken to mitigate it. Several necessary sections in this correlation were identified based on the qualitative data: 1) sufficient awareness about risk factors and ways to manage them; 2) sufficient level of perceptible risk control; 3) trust in other subjects involved in a risky space. Findings reported in other studies confirm the significance of the foregoing factors for selecting a risk management strategy [34–36].

An empirically fixed preference in taking passive, and not active, actions aimed at managing risks can be associated with the fact that people do not consider themselves responsible for their own health and life safety; therefore, they rely on instructions and actions issued and taken by other competent authorities [37]. Active strategies imply that people should act on their own. This includes obtaining relevant knowledge about health risks since high awareness not only promotes actions aimed at mitigating risks but also makes it possible to keep a stable mental state, that is, without any anxieties about health risks [38]. Such reasons as poor literacy and awareness about risk factors and ways to manage them reduce a person's ability to actively participate in risk mitigation and this is consistent with our findings.

Within the self-protective behavior context, not only actions are to be considered but the intention as well. People have been established to take actions either to mitigate or avoid risks. And here risk avoidance, on one hand,

can be an active action, which involves choosing an option how to avoid a risky space, that is, situations or places, which can be potentially hazardous for health. On the other hand, avoidance can be passive, in other words, inactive, when risks are mitigated and neutralized only in a person's mind without any actual effects on a risky environment. Researchers call the second avoidance type 'passive adaptation', which is largely manifested as a consequence of existing lack of trust in subjects responsible for making risk-related decisions [39].

**Conclusion.** Duality of the components that constitute self-protective strategies is manifested upon exposure to health risks. Both active and passive behavior can be adopted when such strategies are implemented. The highest health risk as subjectively perceived by employed people is associated with social risk factors determined by a person's existence within the society. This leads to active behavior, which is typical for a smaller proportion of Russians. Passive behavior is determined by lack of necessary knowledge, skills and resources and is implemented in a situation when a person perceives a risk as unmanageable and is not interested in its mitigation.

Formation of self-protective behavior triggers the necessity to feel stability in people's subjective perception. The emotional compo-

nent, which arises under uncertainty and exposure to uncontrollable risks, leads to inactivity in most cases. Within this context, human adaptation resources become a significant factor that promotes manifestations of social skills and mutual support upon exposures to risks.

Given all the above-stated, the following actions can be recommended: 1) to develop a strategy aimed at preventing and controlling health risks, including monitoring of subjective risk perception and using its results to raise people's awareness about potential hazards; 2) to create conditions for active interaction between subjects involved in a risky space, which emphasizes the importance of such social institutions as education, health-care and local communities in creating a safety culture as well as people's trust in them. These recommendations highlight the significance of mutual responsibility for safety where team efforts can substantially enhance the level of security for the population. This can be achieved through creating public initiatives and programs promoting cooperation between various social groups.

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