International Journal of Emerging Trends in Health Sciences

Volume 04, Issue 1, (2020) 19-26

www.ijeths.eu

Risk factors for workers of shaft labour forms in the south of Russia

Yana Korneeva*, Northern (Arctic) Federal University named after M.V. Lomonosov, emb. Northern Dvina, 17, 163002 Arkhangelsk, Russian Federation https://orcid.org/0000-0001-9118-9539

Suggested Citation:
Korneeva, Y. (2020). Risk factors for workers of shaft labour forms in the south of Russia. *International Journal of Emerging Trends in Health Sciences. 04*(1), 19–26.

Received December 15, 2020; revised March 20, 2020; accepted April 22, 2020.
Selection and peer review under the responsibility of Prof. Dr. Nilgun Sarp, Uskudar University, Istanbul.

Abstract

The purpose of this study is to identify the most uncomfortable climatic, geographical, industrial and social factors in the opinion of shift workers of various professional groups in the south of the Russian Federation. The study was conducted, where 82 employees participated and engaged in the construction of the Crimean Bridge, using shift work organisation. Research methods include the study of documentation, observation, questionnaire and statistical methods. The most uncomfortable climatic, industrial and social factors for shift workers in the south of the Russian Federation are high temperatures, wind, solar radiation and high humidity; noise, chemical factors, enhanced monitoring of compliance with safety regulations and high labour intensity and lack of developed cultural infrastructure, lack of food and difficulties with transport and communications. The statistically significant differences were found in assessing the discomfort of climatic, geographical, industrial and social factors as shift workers of various groups.

Keywords: Risk factor, south, shift method, labour psychology, climatic factors, production factors, social factors, construction of large facilities.

* ADDRESS FOR CORRESPONDENCE: **Yana Korneeva,** Northern (Arctic) Federal University named after M.V. Lomonosov, emb. Northern Dvina, 17, 163002 Arkhangelsk, Russian Federation.
E-mail address: amazonkca@mail.ru / Tel.: +7-960-004-5657

1. Introduction

The study was carried out with the financial support of the grant of the President of the Russian Federation for the state support of young Russian scientists—candidates of science (MK-6409.2018.6). In the studies of many authors, it was found that three groups of factors influence workers in shift work organisation: climatic and geographical factors related to climate peculiarities; production, caused by the danger and harmfulness of production; and social, depending on the conditions of group isolation (Jena & Goswami, 2012; Korneeva & Pryalukhin, 2019; Korneeva & Simonova, 2016; Korneeva, Simonova & Tyulyubaeva 2016; Krause, 2007; Tyulyubaeva, Korneeva & Simonova, 2016). Based on all these factors, requirements are formed for the body of the shift worker, which often exceeds his reserves, which excludes the possibility of the body's full adaptation to these conditions and causes the occurrence of occupational health risks. The scientific research in the field of the impact of shift factors on workers was carried out mainly in the Far North and the Arctic (Korneeva & Pryalukhin, 2019; Niu et al. 2011; Pavlis 2007; Tyulyubaeva et al., 2016). It was revealed that professional work on a rotational basis in the Far North contributes to the formation of discomfort in the body and subsequently to the development of destructive personal qualities of workers. All these ultimately lead to a deterioration in the mental state of workers and a decrease in labour productivity and labour efficiency (Korneeva & Pryalukhin, 2019).

Note that in the south of Russia, the shift method of labour organisation is also widely used. With this regard, it is necessary to determine the difference in the impact of shift factors on workers depending on the location of shift camps: in the north or south of the Russian Federation. This will make it possible to understand which psychological support technologies for shift personnel developed for the production facilities in the north of Russia can also be applied to enterprises located in the south of the country. The extremeness of shift labour is due to a greater extent to the methods of labour organisation or difficult climatic and geographical conditions.

The shift method of labour organisation is widespread in the following southern regions of Russia: Astrakhan Oblast, Krasnodar Territory and the Republic of Crimea. The climatic and geographical factors are amongst the key ones in assessing the extremeness of shift work, so it is important to assess the effect of their impact on workers. The climate in these regions is more arid, with strong winds, sometimes hurricanes, and with a high level of solar radiation, which largely affects the work of shift workers (Korneeva & Pryalukhin, 2019; Niu et al., 2011). Thus, the climatic and geographical conditions of the south of Russia, where the production activity is carried out on a rotational basis, can be called extreme. These conditions are evaluated differently by the staff themselves: for some of them, employees are adapted, know how to behave and act and how to protect themselves. Therefore, their subjective assessment of discomfort is reduced. The other part still causes certain difficulties and requires more attention from enterprise management.

The purpose of this study is to identify the most uncomfortable climatic, geographical, industrial and social and household risk factors according to a survey of shift workers of various professional groups in southern Russia (Korneeva & Yuryeva, 2017).

2. Materials and research methods

To achieve this goal, a study was conducted, where 82 shift workers involved in the construction of the Crimean bridge took part, of which 75 men and 7 women aged 21–64 years (average age 41.31 ± 11.180), whose work experience on a rotational basis from 3 to 30 years (average experience 8.021 ± 6.4503) and the shift experience in the south from 1 to 20 years (average experience 3.543 ± 3.6660). The study was conducted from June to July 2018 (the duration of the shift check-in is 14 days, and the rest period is 14 days). Workers took part in the study by their personal consent; the selection by other parameters was not required. Most of the interviewed workers live in Rostov (48%) and Astrakhan (13%) regions. At the same time, the majority of respondents live in cities—56 people and in rural areas—24 people.

Research methods include the study of documentation, monitoring the workflow, questionnaires and statistical methods of data analysis. The developed questionnaire was aimed at obtain information about the biographical data of the employee and the features of his work. A questionnaire was used to conduct a subjective assessment of the comfort–discomfort of climatic, geographical, industrial and social factors on a five-point Likert scale, where 1—the factor is not felt at all, comfortable, and 5—that is felt maximum, uncomfortable.

The statistical analysis methods consist of descriptive statistics and multivariate analysis of variance. The statistical data processing was performed using the IBM Statistical Package for the Social Sciences Statistics 22.00 [license agreement No. Z125-3301-14 (Northern Arctic) Federal University named after MV Lomonosov].

3. Research results

According to descriptive statistics, the most uncomfortable climatic and geographical factors for shift workers in the south of the Russian Federation are as follows: high temperatures (3.06 ± 1.528), high humidity (2.22 ± 1.294), drought (2.04 ± 1.344), rain and showers (2.09 ± 1.371), wind (2.59 ± 1.412), dust storms (2.05 ± 1.254) and solar radiation (2.22 ± 1.475). Most likely, this is because the staff mainly works in the open air at high altitudes, and high temperatures and solar radiation negatively affect the functional state of the body, reducing endurance, and often lead to sunstroke. Wind, rains and dust storms—all these can lead to equipment breakdown and thus cessation of work. In addition, the wind prevents workers from concentrating on professional tasks.

According to the respondents, comfortable factors include factors such as changing time zones (1.27 ± 0.742), geomagnetic disturbances (1.43 ± 0.961), barometric pressure drops (1.44 ± 0.894) and changes in the oxygen content in the air (1.54 ± 1.107). Such a factor as changing time zones often does not affect workers at all since most of them live and work in one place. Most of the workers are young people, and they are less sensitive to geomagnetic disturbances and barometric pressure drops.

According to the results of this study, the most uncomfortable production factors during the construction of the Krymsky Bridge facility for shift workers in southern Russia were noise (2.79 ± 1.581), vibration (1.95 ± 1.311), chemical factors (2.39 ± 1.579), illumination (2.04 ± 1.307), physical activity (2.16 ± 1.227), monotony and static physical activity (2.26 ± 1.348), elevated surface temperature of the equipment (2.28 ± 1.322), air humidity (2.05 ± 1.301), neuropsychic overloads (2.15 ± 1.352), enhanced control of compliance with corporate standards (2.19 ± 1.370), enhanced control l compliance with safety precautions (2.33 ± 1.483), the inability to choose short breaks (2.07 ± 1.340) and high labour intensity (2.25 ± 1.401). Noise is the most uncomfortable factor for builders since it is the main factor in this area and is due to the nature of the activity. The effect of noise on the human body, first of all, is reflected in the cardiovascular system: noise can change the heart rate and increase or decrease blood pressure. The frequency of exposure and noise levels directly affects the incidence of the central nervous system. The workers under constant exposure to noise experience the negative changes in the body.

Chemical factors also negatively affect human health—they can lead to various diseases. Poor lighting also refers to negative factors, which is associated with prolonged work in night shifts under artificial lighting.

Production factors that are comfortable for employees include the level of static electricity, the lack of professional support from colleagues and also work at height. This may be due to high adaptability to these factors.

According to descriptive statistics, the most uncomfortable social factors for shift workers working in the southern regions of Russia include lack or lack of food (2.06 ± 1.336), difficulty with transport and communications (2.05 ± 1.322), lack of developed cultural infrastructure (2.15 ± 1.509), limited personal space (1.95 ± 1.341), lack of food and recreational activities and 4–8 people living in the same

room at the same time. All these in aggregate negatively affect workers. Social isolation of the team, adverse living conditions, psycho physiological and psycho emotional discomfort, limited contact circle, prohibition of smoking or drinking alcohol—all these factors are assessed by the staff as minimal or not causing particular discomfort.

The professions demanded during the construction of the Krymsky Bridge facility have significant differences in working conditions, so it can be assumed that workers will evaluate the comfort–discomfort of climatic, geographical, industrial and social factors differently. A professiological analysis of all the specialties of the workers who took part in the study was carried out, following which all the staff were divided into four professional groups: electric gas welders, installers, public servants and machinists.

The first group includes professions such as welders and electric gas welders. The duties of this group include plasma, gas, arc and manual welding of any [including particularly complex parts and components of assemblies; structures of various types of steel; non-ferrous metals and alloys and welding of building, technological and engineering structures under work under various types of loads (such as complex configurations; welding of various elements, parts and structures on complex electronic and electronic computing equipment and special devices; welding of assemblies, devices and structures that are Xia in different planes and welding very complex parts and structures in all possible spatial positions of the future weld)]. Professionally important qualities of this group include the ability to long, monotonous work, practical and technical thinking, spatial imagination and thinking, emotional stability, accuracy, patience and responsibility (Braude, 2013).

The second group includes professions such as electrician adjuster, installer-sharpener, installer of steel and reinforced concrete structures. The duties of workers in this group include installation of welded and other metal structures, assembly and laying works, dismantling of structures and structures. Professionally important qualities of workers in this group are a good eye, physical strength and endurance, coordination of movements, dexterity, speed of reaction, accuracy of movements, developed spatial thinking and technical literacy.

The third group includes professions such as maid, assistant commandant, cleaner of office and utility rooms, carpenter and locksmith. The duties of this group include the cleaning and maintenance of clean living spaces, as well as office and utility rooms. Professionally important qualities of this group are physical endurance, attentiveness and accuracy.

The fourth group includes such professions as crane operator, concrete pump driver, crawler crane driver and crane driver. The duties of this group include the management of overhead and lock cranes equipped with various lifting devices. The professionally important qualities of this group are the ability to recognise small deviations of technological parameters from specified values by visual signs, the ability to assess the direction and speed of an object, physical endurance, mental and mental stability, fast motor reaction and accurate eye (linear, angular and volumetric) [Kotik, 1993].

To study the differences in assessing the comfort–discomfort of climatic, geographical, industrial and social factors, the shift workers of various professional groups engaged in the construction of the Crimean Bridge facility in southern Russia (on a five-point Likert scale, where 1: the factor is not felt at all, comfortable; 2: the factor is felt insignificantly and brings minimal discomfort; 3: the factor is felt as uncomfortable and complicates the work and life activity; 4: the factor is felt very uncomfortable, which can lead to Novki and the deterioration of the organism and being and 5: maximum felt uncomfortable always leads to a stop in the work and a significant deterioration of the body and being. A multivariate analysis of variance was applied. Multivariate tests show the statistically significant results of the influence of a factor such as belonging to a specific professional group on the results of the study (p = 0.001). The p-level of significance is the probability of obtaining for the given probability distribution model of the values of a random variable the same or more extreme statistic value (arithmetic mean, median, etc.), compared with the previously observed, providing that the null hypothesis is true (null hypothesis—this is the hypothesis of the absence of differences). p is the

probability of accepting the null hypothesis (what is the probability that there are no differences). In this case, this means that the probability is 0.1% that there are no differences between the estimates of representatives of various professional groups. The results of one-dimensional tests are shown in Tables 1–3.

Table 1. Evaluation of comfort–discomfort of climatic and geographical factors for shift workers of various professional groups during construction in the south of the Russian Federation

Risk factors	Electric welders	Installers	Domestic workers	Drivers	Significance level *p*
High temperatures	3.7 ± 1.25	2.5 ± 1.39	2.7 ± 1.84	3.9 ± 1.36	0.006
High humidity	3.1 ± 1.20	1.9 ± 1.13	1.8 ± 1.24	2.5 ± 1.41	0.004
Drought	2.3 ± 1.45	1.7 ± 1.12	2.1 ± 1.49	2.7 ± 1.59	0.107
Rains and showers	2.6 ± 1.32	1.9 ± 1.48	1.9 ± 1.38	2.1 ± 1.28	0.494
Time zone changes	1.4 ± 0.81	1.3 ± 0.86	1.4 ± 0.77	1.1 ± 0.35	0.787
Geomagnetic disturbances	1.8 ± 0.86	1.5 ± 1.18	1.5 ± 0.97	1.1 ± 0.26	0.282
Wind	2.9 ± 1.29	2.6 ± 1.58	2.5 ± 1.27	2.3 ± 1.22	0.600
Dust storms	2.3 ± 1.08	2.1 ± 1.37	1.5 ± 1.19	2.0 ± 1.19	0.400
Solar radiation	1.8 ± 1.22	2.1 ± 1.49	2.5 ± 1.51	2.9 ± 1.58	0.132
Barometric pressure differences	1.8 ± 1.05	1.2 ± 0.69	1.6 ± 1.04	1.5 ± 0.99	0.140
Change in the oxygen content in the air	1.8 ± 1.24	1.5 ± 1.19	1.7 ± 1.32	1.3 ± 0.46	0.632

As shown in Table 1, the statistically significant differences in the assessment of comfort–discomfort of the climatic and geographical factors of shift workers of various professional groups involved in large-scale construction in the south of Russia are observed for the following factors: high temperatures (p = 0.006) and high humidity (p = 0.004). Machinists gave a higher assessment of the discomfort of high temperatures compared with representatives of other professional groups. This is because they perform their duties most often in closed cabs of cars that are made of metal. Moreover, the high air temperature and the scorching sun heat these cabins strongly, creating discomfort for the employee.

Discomfort from high temperatures is experienced to a large extent by electric and gas welders. In the process of their work, they heat the metal to very high temperatures. At the same time, the overall temperature of the working area as a whole reaches significant values. Especially, when it comes to welding inside metal beams, there is no access to fresh air.

Moreover, the highest assessment of the discomfort of high humidity compared to representatives of other professional groups was given by electric welders. This is because condensation builds up at high humidity, which often leads to equipment breakdown (Korneeva & Pryalukhin, 2019).

Table 2. Assessment of comfort–discomfort of production factors for shift workers of various professional groups during the construction of the Crimean Bridge

Risk factor	Electric welders	Installers	Domestic workers	Drivers	Significance level *p*
Noise	2.8 ± 1.52	2.7 ± 1.56	2.3 ± 189	30 ± 1.36	0.702
Vibration	2.1 ± 1.50	2.2 ± 1.42	1.2 ± 056	1.9 ± 1.10	0.114
Chemical factors	2.8 ± 1.52	2.4 ± 1.74	1.5 ± 097	2.5 ± 1.41	0.114
Illumination	2.5 ± 1.37	1.9 ± 1.28	1.4 ± 096	2.2 ± 1.27	0.113
Physical exercise	2.4 ± 1.21	2.1 ± 1.13	1.5 ± 066	2.7 ± 1.58	0.034
Monotonia and static exercise	2.4 ± 1.26	2.3 ± 1.44	1.5 ± 088	2.9 ± 1.41	0.077
Elevated equipment surface temperature	2.6 ± 1.59	2.4 ± 1.52	1.4 ± 077	2.5 ± 1.36	0.087

Increased and lowered temperature of the working area	2.8 ± 1.28	1.9 ± 1.03	2.0 ± 129	2.5 ± 1.36	0.099
Air humidity	2.3 ±1.13	1.9 ± 1.43	1.9 ± 119	2.0 ± 1.19	0.888
Static electricity level	1.9 ±1.39	1.5 ±1.08	1.3 ±0.63	1.5 ±0 .92	0.404
The inability to leave the premises during working hours	1.8 ± 1.00	1.7 ± 1.1	1.3 ± 0.86	2.5 ± 1.64	0.083
Neuropsychic overload	1.9 ± 0.99	2.24 ± 1.34	1.9 ± 1.28	2.4 ± 1.6	0.648
Enhanced corporate compliance	2.3 ± 1.08	2.0 ± 1.5	1.5 ± 0.66	3.0 ± 1.4	0.016
Enhanced safety monitoring	2.8 ± 1.60	2.2 ± 1.53	1.4 ± 0.65	2.9 ± 1.36	0.022
No short breaks available	2.3 ± 1.24	1.9 ± 1.13	1.2 ± 0.56	3.0 ± 1.60	0.001
No professional support from colleagues	1.6 ± 1.09	2.1 ± 1.48	1.2 ± 0.83	1.9 ± 1.44	0.225
Work at height	1.9 ± 1.20	1.6 ± 1.16	1.0 ± 0.00	2.1 ± 1.59	0.074
High labour intensity	2.3 ± 1.01	2.1 ± 1.40	1.4 ± 1.12	3.3 ± 1.49	0.003

As shown in Table 2, the statistically significant differences were identified in assessing the comfort and discomfort of production factors of shift workers of various professions during the construction of the Krymsky Most facility according to the following parameters: physical activity (p = 0.034), enhanced monitoring of compliance with corporate standards (p = 0.016), enhanced monitoring of compliance with safety regulations (p = 0.022), the inability to choose short breaks (p = 0.001) and high labour intensity (p = 0.003). The highest assessment of the discomfort of these factors compared with representatives of other professional groups is noted by machinists and electric welders. This is because these workers perform most of the complex work, whereas they are usually fewer in number compared to other specialists. The effectiveness and efficiency of the entire working team depend on their work. Therefore, the intensity of the work of these specialists is as high as possible and does not imply even short-term breaks. In the process, they move from one section to another, whereas installers can take short breaks in work in anticipation of welding work. Equally important is the fact that at such facilities there is a high staff turnover due to the complexity of professional tasks. Therefore, machinists and electric welders are often forced to take on additional work.

Table 3. Evaluation of the comfort–discomfort of social factors for shift workers of various professional groups in southern Russia

Risk factor	Electric welders	Installers	Domestic workers	Drivers	Significance level *p*
Social isolation of the team	1.6 ± 0.81	1.8 ± 1.23	1.0 ± 0.00	2.7 ± 1.37	0.001
Adverse placement conditions	1.6 ± 0.81	1.7 ± 0.99	1.5 ± 1.19	2.2 ± 1.21	0.285
Lack of food	1.6 ± 1.03	2.2 ± 1.36	1.6 ± 1.19	2.8 ± 1.52	0.047
Difficulty with transport and communication	2.1 ± 1.18	2.1 ± 1.40	1.3 ± 0.63	2.7 ± 1.49	0.042
Psychophysiological and psychoemotional discomfort	2.1 ± 1.63	1.6 ± 1.07	1.6 ± 1.04	2.1 ± 1.25	0.366
Frequency of work	1.9 ± 1.12	1.8 ± 1.09	1.2 ± 0.44	2.4 ± 1.18	0.036
Forced circle of contacts	1.8 ± 1.27	1.9 ± 1.34	1.3 ± 0.63	2.1 ± 1.28	0.406

Lack of developed infrastructure	2.0 ± 1.67	1.9 ± 1.22	1.5 ± 0.78	2.1 ± 1.30	0.655
Narrowing the area of personal space	1.5 ± 0.82	1.9 ± 1.36	1.7 ± 1.32	2.60 ± 0.50	0.109
Information exhaustion	1.8 ± 1.05	1.7 ± 1.29	1.5 ± 0.97	2.2 ± 1.32	0.483
Lack of developed cultural infrastructure	2.1 ± 1.54	2.2 ± 1.61	1.4 ± 0.65	2.6 ± 1.59	0.189
Prohibition of smoking or drinking alcohol	1.8 ± 1.38	1.8 ± 1.42	1.1 ± 0.28	2.0 ± 1.51	0.263
Lack of psychological support from colleagues	1.8 ± 1.29	1.7 ± 1.19	1.0 ± 0.00	1.8 ± 1.32	0.213

As shown in Table 3, there are statistically significant differences in the assessment of comfort–discomfort of social factors of shift workers of various professional groups in the south of Russia according to the following parameters: social isolation of the team (p = 0.001), lack or lack of food (p = 0.047), difficulty with transport and communications (p = 0.042) and periodicity of labour activity (p = 0.036). Machinists and electric and gas welders gave the highest rating of discomfort for all these factors—their work is highly intensive, and the nutritional requirements of these specialists are higher than those of other professional groups. These workers need a full replenishment of calorie (number of calories) and vitamins to maintain their performance, which, alas, is not always provided in the required amount by employers.

Work at complex technological facilities is often accompanied by problems with telephone communications, which negatively affects both the work and the life of the personnel as a whole. For workers with high labour intensity, this factor is the most significant, which is largely due to the lack of free time.

In addition, the southern regions of Russia are more densely populated than the northern ones, and living conditions in a shift camp allow you to go beyond its borders, visit nearby settlements and communicate with the local population, which significantly reduces the degree of group isolation of staff.

4. Conclusions

The most uncomfortable climatic and geographical factors for shift workers in southern Russia are high temperatures, wind, solar radiation and high air humidity. The most uncomfortable production factors during the construction of the Krymsky Most facility for shift workers in southern Russia are noise, chemical factors, enhanced monitoring of compliance with safety regulations, elevated surface temperature of equipment, monotony and static physical stress and high labour intensity. The most uncomfortable social factors of shift workers in southern Russia are the lack of a developed cultural infrastructure, the lack or lack of food and the difficulty with transport and communications.

According to the working conditions, the professions demanded during the construction of the Krymsky Most facility can be divided into four professional groups: electric gas welders, installers, public servants and train drivers.

Statistically significant differences were found in assessing the comfort and discomfort of the following climatic, geographical, industrial and social factors as shift workers of various professional groups engaged in the construction of the Crimean Bridge facility in southern Russia: high temperatures, high humidity; physical activity, enhanced monitoring of compliance with corporate standards, enhanced monitoring of compliance with safety regulations, the impossibility of choosing short breaks, high labour intensity, social isolation of the team, lack or lack of food, difficulty with transport and communications and periodicity of work. All presented factors are most uncomfortably evaluated by engine drivers and electric welders. These two groups can be attributed to risk groups.

5. Funding

The study was carried out with the financial support of the grant of the President of the Russian Federation for the state support of young Russian scientists—candidates of science (MK-6409.2018.6).

References

Braude, M. Z. (2013). *Labor protection during welding in mechanical engineering* (p 141). Moscow, Russia: Book on Demand.

Jena, R. K. & Goswami R. (2012). Shift workers vs. day workers: a comparative study of psychological, social and personal well-being. *Far East Journal of Psychology and Business, 8*(3), 27–37.

Korneeva, Y. & Pryalukhin, E. (2019). *Comparative analysis of psychological safety of shift workers in the South and North of the Russian Federation*. In II International Scientific-Practical Conference Psychology of Extreme Professions (ISPCPEP 2019). Paris, France: Atlantis Press. Retrieved from https://doi.org/10.2991/ispcpep-19.2019.23

Korneeva, Y. A. & Simonova, N. N. (2016). Evaluation of the extreme factors of shift labor in the Arctic conditions by workers with various regulatory processes *Hygiene and Sanitation, 95*(4), 381–386.

Korneeva, Y. A. & Yuryeva A. S. (2017). Stylistic features of the thinking of specialists of oil companies of various professional groups. *Scientific Journal 'United-Journal', 6*, 24–27.

Korneeva, Y. A., Simonova, N. N. & Tyulyubaeva, T. O. (2016). Subjective assessment of workers' dangers of various situations arising in professional activities during shift work organization in the Arctic. *Labor Safety in Industry, 7*, 60–65.

Kotik, M. A. (1993). The nature of human operator errors: the example of transp. Means (251 p). Moscow, Russia: Transport.

Krause, T. M. (2007). Rhythms in psychology: circadian rhythms of functional states (FPI test) in human ontogenesis. *Pedagogy, Psychology and Biomedical Problems of Physical Education and Sport, 10*, 78–83.

Natural and climatic conditions of the Astrakhan region [Electronic resource]: [official site] Retrieved from https: //helpiks.org/2-95456.html (accessed: 8.01.2019).

Niu, S. F., Chung, M. H., Chen, C. H., Hegney, D., O'Brien, A. & Chou, K. R. (2011). The effect of shift rotation on employee cortisol profile, sleep quality, fatigue, and attention level: a systematic review. *Journal of Nursing Research, 19*(1), 68–81. doi:10.1097/JNR.0b013e31820c1879

Pavlis, A. (2007). Cognitive, neuroanatomical and neuroendocrine effects of long-term rotating shift work in a nursing sample. Melbourne, Australia: School of Psychology, Victoria University.

Tyulyubaeva, T. O., Korneeva, Y. A. & Simonova, N. N. (2016). The model of psychological safety of workers in oil and gas companies with shift work organization in the Arctic. *Psychology and Psychotechnics, 5*(92), 457–467.

Unified tariff and qualification reference book of jobs and occupations of workers (ETKS). 2. Part No. 1 Approved by the Ministry of Labor of the Russian Federation of November 15, 1999 N 45. Retrieved from http://docs.cntd.ru/document/901760548.