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HEALTHY FATHER – HEALTHY CHILDREN (RESULTS OF LONG-TERM COHORT MONITORING IN THE VOLOGDA OBLAST)



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A man is not born a father.
He is born with a predisposition to take care of children...
Therefore, in the life of almost every man there is a temporary
sequence of his entry into the role of fatherhood.

(Ildarkhanova, 2019).

Children and their health is the foundation of human potential formation. Health is the most important component on which a person's education and socialization throughout life depends. It has been proved that parents play an enormous role in children's health care: educational potential, heredity, medical activity. There are numerous studies on the interrelation of conditions and risk factors for child health

on mother's part. Their results are used in the development and implementation of maternal and child health programs at all levels of government. At the same time, there are few publications on the physical and neuropsychological state of expectant fathers. Thus, there is no full-fledged information and empirical basis for substantiating the tools for preserving men's health as a risk factor for children's health. There is insufficient data to develop preventive measures and systematize the interaction of family, health care, education and social protection organizations to prevent child health risks on the part of the father. In view of the relevance of the topic, we made an attempt to identify risk factors for the health of children born in 1998, 2001, 2004, 2014, 2020 in the Vologda Oblast on the father's side as part of the long-term research "Studying the conditions of a healthy generation formation". The importance of studying the risks to child health on the father's side stems from the need to develop comprehensive measures aimed at the male population, starting from childhood, in order to preserve reproductive health and minimize the consequences for the health of the future generation. We suppose that prevention of risk factors on the part of the father and reduction of the existing ones can significantly improve the health of the child population from the medical point of view, increase life expectancy from the demographic point of view, reduce health care costs, social and disability benefits, create conditions for improving the quality of human potential of the child population and human capital in the future from the economic point of view.

Fatherhood, motherhood, childhood, risk factors, children's health, Vologda Oblast.

Introduction

The Russian Federation, as a social state, provides for the protection, support and defense of the family, motherhood, fatherhood and childhood on its territory (Article 7 and Part 1 of Article 38 of the Russian Constitution). The Family Code of the Russian Federation envisions protection of the family, motherhood, fatherhood and childhood as priority state values. In an interview in February 2020, Russian President Vladimir V. Putin stated that the status of "mother" and "father" should be preserved. He emphasized that the concepts of "parent 1" and "parent 2"¹ would not apply in the country, thereby advocating for traditional family values and once again emphasizing the importance and significance of both parents for the future generation.

Nevertheless, at the present stage some families do not fully perform their main functions, primarily reproductive and educational, social self-determination. The low birth and high mortality rates predetermine the reduction of Russia's population, despite some improvement of the demographic situation in the last decade (Rabets et al., 2016).

On March 16, 2015, the Vologda Oblast passed Law 3602-OZ², which regulates relations

in the sphere of family, maternity, paternity and childhood protection, in which most of the articles are devoted to the family, women and children. It should be noted that there are more scientific works concerning the influence of mother's social, family and material status, and education on child's development than those studying "fatherhood" (Nekrasov, 2015).

Considering that in Russia, despite all the efforts taken at the state and public level, the morbidity and mortality of the child population remain quite high, it becomes extremely relevant to study the controllable factors of its deterioration, including those on the part of parents.

Previously, the results of the monitoring "Studying the conditions of a healthy generation formation" revealed that each age period is characterized by a specific set of factors that determine the physical, neuro-psychological development of children. In early childhood, these are medico-biological factors and maternal lifestyle, in particular her poor health, anemia before and during pregnancy, bad habits, working conditions a year before pregnancy that do not meet sanitary standards, the nature of infant feeding (Shabunova et al., 2021).

¹ A. Nikolsky. Putin promised to maintain the status of "dad" and "mom" during his presidency. Available at: https://www.gazeta.ru/social/news/2020/02/13/n_14032225.shtml (Accessed: April 7, 2022).

² Electronic fund of legal and regulatory documents. Available at: <https://docs.cntd.ru/document/424041762>

In this connection, it is necessary to investigate the health of fathers as a risk factor for the health of the newborn child, which determined the purpose of our work.

First of all, we studied the results of domestic and foreign research. The next task was to identify the relationship of diseases, pathologies of newborns and risk factors on the part of the father. Thus, the object of the study was the health of newborn children born in 1998, 2001, 2004, 2014, 2020 in the Vologda Oblast; the subject was the risk factors for children's health by the father during the year and in the period of newbornhood. The scientific novelty of the work lies in the fact that the results allow us to assess the specific influence of various factors on the health of the newborn child on the part of the father.

Research methodology

Since 1995, Vologda Research Center of the Russian Academy of Sciences has been studying the conditions for the formation of a healthy generation. The prospective monitoring of the observation of cohorts of families with children is used as an instrument of sociological method. The author's methodology, developed by members of the research team, is used. It provides answers to the questions of the questionnaire by different groups of respondents: children, parents (mainly mothers) and medical workers. The questions for the children of the given sample included ones about the state of neuro-psychological and physical development and living conditions. The questionnaire consisted of two parts, one of which, concerning children's living conditions and development, was filled out by parents, the other one, containing assessment of child health, was filled out by neonatologists and district pediatricians (Shabunova, 2017).

The article used sample results of the 1998, 2001, 2004, 2014, and 2020 child monitoring studies, as well as statistical data on fertility, morbidity of the child population provided by Rosstat and the Russian Ministry of Health.

The need to study fatherhood as a factor in the formation of children's health involves expanding the subject area and combining different methods. According to foreign scientists, not only social statistics, but also survey data are needed. It is important to choose the right category of respondents for data processing (father, mother, child or other persons), to exclude the analysis based on only one source (for example, interviewing only the father or only the mother). Meanwhile, more than half of the paternity surveys conducted in the United States in the 1990s were constructed this way (Marsiglio et al., 2000).

In order to exclude errors related to the misinterpretation of the "absence of a risk factor" provision, a group of mothers who were married at the time of filling out the questionnaire and thus had the most complete and, most importantly, reliable information about the child's father compared to a group of single women was selected for analysis.

For example, when asked about employment, education of the child's father, and frequency of alcohol consumption, the proportion of unanswered questions ranged from 0.8% to 4.4% among married women, from 55.6% to 63.0% among unmarried women, and from 50.0% to 57.1% among widowed and divorced women. We analyzed a set of data on the health characteristics of newborn children in five cohorts. The sample consisted of 910 children and mothers who participated in the 1998, 2001, 2004, 2014, and 2020 surveys (*Table*).

The study understood health "...as a state of life activity corresponding to the biological age of the child, the state of harmonious unity of physical and intellectual characteristics, formation of adaptive and compensatory reactions in the process of growth"³. The qualitative analysis involved assessment of anatomical and physiological capabilities of the child during the newborn period. The pathopsychological and adaptive approaches to the assessment of child health and development were used. The first assumes that when diagnosing the physical and mental

³ Vorontsov I.M., Mazurin A.V. (1985). Propedevtika detskikh boleznei [Propaedeutics of childhood diseases]. Moscow: Meditsina. 441 p.

Characteristics of the research sample (in abs. numbers)

Sample size	Cohort born in 1998	Cohort born in 2001	Cohort born in 2004	Cohort born in 2014	Cohort born in 2020	Total	
						abs.	%
Database for the research	120	177	173	228	212	910	100,0

Source: Results of the monitoring "Studying the conditions of a healthy generation formation" 1998, 2001, 2004, 2014, 2020.

state of a child, physicians are guided by ideas about medical norms and pathology. The second approach is an adaptive one (Baranov et al., 2006). It considers human health in more detail, with adaptation understood as a dynamic equilibrium between the body and the conditions of life activity. The Apgar Scale scores were used as criteria for the health status of newborns (Tsvelev, Ivanov, 2009). The presence or absence of diseases, age-appropriate neuropsychological and physical development were taken into account.

To analyze the impact of the studied risk factors, we used relative risk (RR) indicator calculated as a ratio of the risk of disease development in the "exposed" group (exposed to a risk factor) to the risk of disease development in the "unexposed" group. Relative risk shows by how many times exposure to a risk factor increases the likelihood of disease development⁴. We used data on paternal risk factors and the presence of disease in the newborn infant.

Taking into account data from scientific papers, the World Health Organization⁵, and sociological studies, we identified the most frequent groups of risk factors for child health: behavioral, physiological, demographic, and environmental, and considered them from the children's fathers who participated in the child health monitoring.

(1) Behavioral factors are among the controllable and can be minimized. In our study, these are smoking tobacco and drinking alcoholic beverages in excess.

(2) Physiological factors characterize biological features of the human body, in particular, these are diseases of various human

systems and organs, including the presence of hereditary pathology.

(3) Socio-demographic factors refer to the population as a whole. The population is divided into subgroups according to occupation, religious affiliation or income level, education, age, sex. For the purposes of our study, these are the age of father: under 20, under 30, 30 and over, 35 and over, 40 and over; education: secondary specialized and lower, higher, incomplete higher education.

(4) Environmental risk factors are represented by social, economic, cultural and political factors, as well as physical, chemical and biological factors. In our study, these are harmful working conditions of the father, including the presence of chemical and toxic substances, dust, gas, vibration, noise, humidity, radiation and microwave action, high physical load, work on the conveyor belt, high and low temperature, biological hazards, mental stress, work in 2-3 shifts and at night; occupation of the father: work, study, military service, unemployed, not working.

The results of the monitoring survey were processed using SPSS Statistic and MS Excel programs.

Results and discussion

More than 1.43 million children were born in Russia in 2020. This is about 45 thousand fewer than in 2019, and two times lower than the level of the middle of the last century. 2014 saw the highest rate in the new century due to the accession of the Republic of Crimea and the city of Sevastopol. But even so, since 2015 there has been a progressive decline in the absolute number of newborns in Russia⁶.

⁴ Relative risk. Available at: <https://medstatistic.ru/methods/methods7.html> (accessed March 20, 2022).

⁵ Global health risks: Mortality and burden of disease attributable to selected major risks. Available at: https://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf (accessed: March 22, 2022).

⁶ Birth rate in Russia 2021–2022: tables by years and ratings by region. Available at: <https://top-rf.ru/places/565-rozhdaemost-v-rossii.html>

According to the monitoring data, the dynamics of health indicators of newborn children in the Vologda Oblast in the period 1995–2020 is ambiguous. Although the share of “healthy” children increased 6-fold (every third child), and the share of “unhealthy” children decreased by a third, on average two out of three children have various health problems at birth in the region. The number of births with functional abnormalities doubled in 20 years (with a 3-fold increase in Vologda and a 9-fold increase in rural areas (Razvarina et al., 2021).

Scientific papers note that most often fatherhood is considered within the framework of the peculiarities of the institution of the family, the transformation of this concept in modern conditions, as well as the legal and economic status (Semenova, 2014; Voronin and Yanak, 2018; Gruzdeva, 2020; Barsukov and Kalachikova, 2021; Ilyin et al., 2021). Researchers say that, on the one hand, there is formal parenthood, on the other hand, the educational potential of men with families and children is increasing, and men are becoming more involved in caring for children’s health, receiving education, organizing leisure and recreation, that is, in the adaptation and socialization of children (Nurullina, 2019). Men are increasingly active, though not yet on an equal footing with women, in household chores, sharing responsibilities with their wives.

One outcome of a unique Harvard longitudinal study from the late 1930s to the late 1980s, which focused on four generations of boys from the same families, concluded that responsible fatherhood has a positive effect on children, especially boys (Palkovitz et al., 2001). The results of the sociological monitoring of reproductive potential and behavior of the population conducted by the Vologda Research Center of the Russian Academy of Sciences in 2019 in the Vologda Oblast confirm that fatherhood ranks third in the system of values, after family and health (Kalachikova, 2019). Thus, we can say that the institution of fatherhood is transforming.

Nevertheless, paternity is currently insufficiently regulated from the legal, medical, and social points of view (Gerasikina, 2019).

Despite the extremely unfavorable state of health of the male population, medical and biological research is most often focused on the issues of obstetrics and gynecology (Karelskaya, 2016), including the study of the influence of parental health on child development. In most cases, they describe the interrelation of risk factors on the mother’s side.

Partially the importance of the father’s health for the development of the newborn child is presented in the works of domestic scientists (Sofronov and Shakirova, 2010; Baklushina et al., 2014; Ivanov et al., 2018). The correlation between the father’s bad habits and occupational hazards and the child’s decreased birth weight (hypotrophy) has been revealed. Various types of radiation, temperature changes, chemicals, alcohol and smoking are also important. The impact of the future father’s chronic diseases as perinatal risk factors has been shown (Podsvirova et al., 2020).

Current research highlights the specific influence of fathers’ health on cognitive development, social-emotional competencies, psychological well-being, and children’s behavior (Kalina, 2019). Foreign studies have focused on the relationship between selected socio-demographic, socio-economic characteristics and the reproductive health of fathers in different age groups (Kornerup et al., 2021).

Researchers have also found that children of parents who use psychoactive substances, suffer from psychotic disorders, or have experienced post-traumatic stress are more likely to have physical development defects. The authors noted that in half of the cases, the studies covered mother’s mental health, and only 17 percent covered the father’s one (Pierce et al., 2020).

Researchers from the United Kingdom presented evidence that the father’s smoking during pregnancy predetermines the development of attention deficit hyperactivity disorder (ADHD) in the child (Easey, Sharp, 2021).

Swedish researchers, using a retrospective cohort follow-up (sample of 1542000 children born in 1996–2011, related to 893334 mothers and 873935 fathers), found an association of maternal and paternal mental illness and in-

creased risk of injury in children in the first and subsequent years of life (Nevriana et al., 2020).

Researchers at the International Hospital for Maternal and Child Health of the World, Shanghai and Fudan University in China analyzed data from 7,683 women who gave birth. The results showed a relationship between paternal endocrine pathology and child growth parameters (Lin et al., 2022). Canadian researchers corroborated this finding by revealing an association between increased paternal body mass index before conception and increased infant birth weight (hypertrophy) (Retnakaran et al., 2021).

Researchers in Spain have empirically found that increased paternal BMI leads to a risk of cardiovascular disease in offspring (Labayen et al., 2010).

A retrospective cross-sectional analysis using birth certificate data from 2004 to 2015 from the Finger-Lakes Regional Perinatal Data System showed that older paternal age, race/ethnicity, and low educational attainment acted as important predictors of adverse birth outcomes and inadequate birth weight (Meng, Groth, 2018).

Studies have confirmed that low socioeconomic status of the father, a previously unrecognized factor in low birth weight, regardless of the demographic status of the mother, negatively affects the physical condition of the newborn child (McCowan, Horgan, 2009; Enstad et al., 2019).

Let us try to assess the relative risk of child health on the part of the father in a multi-year cohort study in the Vologda Oblast. The paper presents only those factors that have a negative impact on the health of newborn children.

Based on the responses of legally married mothers and data from obstetric, medical history of birth histories completed by neonatologists and obstetricians and gynecologists in maternity hospitals, it is obtained that various factors affect the health of a newborn child, including those on the part of the father.

Behavioral. If the father of the unborn child smokes, the risk of giving birth to a baby with a low Apgar score increases almost twofold (RR = 1.7, 95% CI: 1.38–2.09).

Socio-demographic. Man's financial status has an influence. We analyzed such an indicator as "low purchasing power" on the part of the father. It was found that if the man was in a difficult financial situation at the time of birth, the newborn had a 3-fold increased risk of developing central nervous system agitation syndrome (RR = 3.27, 95% CI: 1.15–9.33).

Older paternal age (over 40 years) also has an adverse effect on the child's cardiovascular system, increasing the likelihood of developing pathology by a factor of 3 (RR = 3.05, 95% CI: 1.18–7.87).

Physiological. Compared with the other groups, physiological factors on the part of the father had the most significant influence. Conditions such as diabetes mellitus increased the likelihood of intrauterine developmental delay in the newborn by 8-fold (RR = 8.13, 95% CI: 1.98–33.36), asphyxia by 16-fold (RR = 16.78, 95% CI: 4.00–70.45); tuberculosis (RR = 2.83, 95% CI: 2.59–3.09) and genitourinary diseases (RR = 2.08, 95% CI: 1.43–3.02) increase the risk of having a baby with a low Apgar score by 2 or more times.

Paternal skin diseases and neonatal complications were found to be associated: the risk of neonatal jaundice 4-fold increased (RR = 4.09, 95% CI: 1.15–14.61), muscular system abnormalities (hip dysplasia, right flatfoot, clubfoot) 11-fold (RR = 11.25, 95% CI: 1.55–81.75).

Digestive diseases in the father's history increased the risk of cardiovascular diseases in the child by a factor of 3 (RR = 3.75, 95% CI: 1.34–10.45), and weight loss by a factor of 5 (RR = 5.31, 95% CI: 1.54–18.36). Diseases of the genitourinary system were 12 times more likely to cause similar pathology in boys (RR = 12.49, 95% CI: 1.67–93.47).

Environmental risk factors. Gas pollution in a man's workplace increases the risk of asphyxia of his child at birth by a factor of 3 (RR = 2.99, 95% CI: 1.35–6.63) and of the development of central nervous system pathologies by a factor of 10 (RR = 10.01, 95% CI: 2.27–44.10).

An expectant father's occupation a year before his wife's pregnancy, which involved chemicals and toxic substances, increased the risk of developing neonatal hypertension syndrome

by 5-fold (RR = 5.94, 95% CI: 1.35–26.17). If the child's father is exposed to radiation and ultrahigh frequency electromagnetic radiation at work, the newborn is 6 times more likely to develop central nervous system abnormalities diagnosed at birth (RR = 6.51, 95% CI: 1.57–27.06).

Conclusion

Thus, almost all groups of risk factors on the part of the father, according to the data of the monitoring "Studying the conditions of a healthy generation formation", affect the health of the newborn child.

Identification of factors and conditions of adverse effects on children's health is very important for improving the child's life not only during the newborn period, but also as they grow up. The qualitative characterization of factors and consequences for the health of the growing generation by the father can be used as an information base for supplementing the

existing system of prevention of neonatal morbidity with targeted measures. We consider it advisable to use the elements of the mechanism of child health protection on the part of the mother (encouragement of motherhood, limitation of labor of the future mother in heavy and hazardous work, health protection of girls of all ages from the first years of life and especially in adolescence and youth, etc.) as the basis for building medical and social support of future fathers, supplementing them with adaptive measures that take into account the specific physiology and development of the male body.

The protection of newborn children's health is a national task. Using the complex of knowledge about risk factors, it is possible to create an effective system of interaction and management of health risk factors at the regional and federal level, to develop a set of measures for prevention, treatment and rehabilitation of the child population.

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