American Journal of Medicine and Medical Sciences 2025, 15(12): 4587-4590
DOI: 10.5923/j.ajmms.20251512.85

Influence of Socio-Hygienic Factors on the Physical and Psychological Development of Adolescents in Remote Regions

Turakulov Uygun Sagdullayevich[1], Rizayev Jasur Alimjanovich[2]

[1]Independent Researcher, Samarkand State Medical University, Samarkand, Uzbekistan
[2]Doctor of Medical Sciences, Professor, Samarkand State Medical University, Samarkand, Uzbekistan

Abstract Adolescence is a critical stage of human development, characterized by intensive physiological, psychological, and social changes. In remote regions, specific socio-hygienic conditions create a unique environment that can significantly influence the processes of growth and development of adolescents. Geographical isolation, limited access to medical and educational services, peculiarities of climatic conditions, and socio-economic challenges form a complex of factors that require detailed study of their impact on the adolescent population. The relevance of this study is determined by the need to understand the mechanisms of influence of socio-hygienic factors on the formation of physical and mental health of adolescents in remote areas. Current demographic trends, urbanization, and migration processes make the study of this issue particularly important for developing effective preventive and rehabilitation programs.

Keywords Adolescents, Remote Regions, Socio-hygienic factors, Physical development, Mental health, Human ecology, Medical and social prevention, Healthcare, Territorial features, Comprehensive health assessment

1. Introduction

Adolescent developmental delays are a complex of psychoneurological, cognitive, and social adaptation symptoms that appear suddenly or gradually, persisting for 3 months or more or leading to long-term social maladaptation [1]. According to a 2023 World Health Organization report, around 200 million adolescents worldwide experience various developmental delays each year. This indicator ranks second among the factors threatening the health of adolescents after cardiovascular diseases.

According to the World Health Organization, by 2030, psychosocial developmental delays among adolescents are expected to become a leading health problem on a global scale. According to estimates, about 15 million adolescents annually experience academic and social disadaptation due to various developmental disorders. According to UNICEF experts, this indicator is 2.3 times higher among adolescents living in remote areas than among city residents [2].

The development of adolescents in remote areas is recognized not only as a medical and pedagogical problem, but also as a serious socio-economic one. This is due to the fact that 76% of adolescents who have experienced developmental delays are forced to live with various psychosocial disorders. These changes include a decrease in academic achievement (68% of cases), disruption of social adaptation (84% of cases), a decrease in communication skills (72% of cases), and disruption of emotional stability (89% of cases). As a result, 43% of such adolescents cannot fully restore their learning process and lag behind in terms of future professional readiness [3].

Developmental delay (DR) is a multifactorial (polyetiological) condition with a complex pathogenesis. Many risk factors influence its development. These include: socio-economic factors (material status of the family, parents' level of education), environmental factors (pollution of the environment, quality of drinking water), psychosocial factors (family stress, effects of khamsin), physical factors (improper nutrition, low physical activity), cultural factors (conflict between traditional values and modern requirements) [4].

Biological factors (gender, age, genetic predisposition), changes in the neuroendocrine system (hormonal imbalance, increased levels of stress hormones), nutritional deficiencies (vitamin and microelement deficiencies), and psychosomatic factors are also important [5]. Primary prevention of developmental delays among adolescents in developed countries remains a pressing issue today. This is due to the high social significance, prevalence, and severe course of the disease spectrum. Early identification and elimination of risk factors is a priority in the prevention of psychosocial phenomena [6].

Received: Nov. 22, 2025; Accepted: Dec. 23, 2025; Published: Dec. 25, 2025
Published online at http://journal.sapub.org/ajmms

According to the OECD (Organisation for Economic Co-operation and Development), in developed countries, psychosocial alienation among adolescents ranks second (18%) among general health problems, after a decline in the quality of education. This indicator is one of the fastest growing in the world. However, Uzbekistan, like many developing countries, does not have complete epidemiological indicators of adolescent development. This is due to the fact that cognitive, emotional, and social disorders are not recorded as a single nosological unit in the group of psychosocial traits [7].

Studies show that psychosocial developmental delays remain at a high level among adolescents older than 12 years. Studies conducted by L.M. Petrova and co-authors in 2018-2023 showed an increase in cases of developmental delay among adolescents from remote areas. At the same time, the level of social disadaptation tends to increase in all age groups, both among boys and girls. In recent decades, a sharp increase in the frequency of developmental delays has been observed in individuals aged 15-19. This age group is called the "peak period of the adolescent crisis," and psychological, physiological, and social changes are most intense during this period.

In gender analysis, emotional and internalization disorders are more common among girls (depression - 34%, anxiety - 42%), while among boys, externalization and behavioral disorders predominate (aggressiveness - 28%, hyperactivity - 31%).

Developmental delays are one of the main causes of social disadaptation. According to statistics, 45% of adolescents experiencing developmental delays need assistance in daily learning activities, 28% cannot achieve independent academic results, and only 34% can return to previous learning effectiveness [8].

In the context of remote areas, these figures are aggravated: 52% of adolescents need pre-correctional assistance, 36% have limited independent development. Only 19% have full recovery potential. According to the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders) and ICD-11 classifications, adolescent developmental delays are a complex of acute psychosocial symptoms caused by sharp deviations from the normal trajectory of development in adolescence. The diagnosis of the disease should be confirmed by the presence of symptoms lasting more than 3 months and the presence of functional delay [9].

Developmental delays in adolescents in remote areas are manifested as a multifactorial, complex, and multifaceted problem. Global trends show that this problem may worsen in the coming years. Therefore, the development of special prevention, diagnosis, and correction programs for this population is becoming a necessity. In the following sections, the pathogenetic mechanisms of this problem, diagnostic approaches, and modern correction methods are discussed in detail.

It has been established that the mechanisms of influence of socio-hygienic factors on the physical and mental development of adolescents are a very complex and multifaceted process. This process consists of the dynamic interaction of biological (genetic, neurobiological, endocrine), psychological (cognitive, emotional, personal) and social (family, school, cultural) factors. Modern scientific achievements show that it is necessary to develop special prevention and correction programs for adolescents living in remote areas. In this case, a comprehensive approach should be applied, taking into account neurobiological, psychosocial, and environmental factors.

According to modern domestic and foreign sources, mental illnesses are widespread among schoolchildren [15]. There is an opinion that a large number of adolescents with this pathology remain outside the attention of psychiatrists and do not receive appropriate medical care [2,6,14]. Numerous studies have been conducted on the factors contributing to the development of mental disorders at this age and their prevention. In addition to genetic and hereditary causes, it has been established that the unfavorable social conditions of adolescents are also of great importance. These include family relationships and dominant upbringing methods, communication with peers, and the presence of social problems [2,10]. Most authors note that an unfavorable family environment often leads to the development of anxiety disorders. It is emphasized that physical violence in the family, especially long-term violence, contributes to the development of post-traumatic stress disorder in adolescence [3,4]. There is an opinion that educational methods based solely on obedience and adherence to established rules, which do not allow independent decision-making, negatively affect the mental health of schoolchildren [13]. Such a situation in the family leads to the development of mental stress and an increase in the level of situational anxiety, which negatively affects the assimilation and socialization of the adolescent. Some authors believe that the mental health of schoolchildren depends more on their immediate environment, especially their interaction with peers. The low social status of their closest friends, their alcoholism, and behavioral disorders (up to criminal behavior) play a negative role. Controversial or formal relationships, as well as the complete absence of communication with adolescents of their age, are both a consequence of mental illness and a contributing factor to its development [12].

An important aspect of the mental well-being of adolescents is life satisfaction, a high assessment of the quality of life, which is closely related to the subjective state of health. The feeling of happiness in childhood is associated with the acquisition of socialization skills and the ability to adapt to environmental conditions, which, in turn, leads to more positive results in adulthood [Source].

In adolescence, the feeling of satisfaction with life largely depends on the experience and relationships experienced. Among the main protective factors are a sense of attachment to parents/family, including social support from at least one caring adult; harmonious communication in the family and benevolent peers who help adapt to new situations and cope with life's difficulties. Satisfaction with life is also related to the structure of the family: children and adolescents living

with their parents are more satisfied with life than those living with other relatives, people who are not related to them, and/or guardians [11].

This study is a comprehensive prospective-retrospective observational study aimed at studying the influence of socio-hygienic factors on the physical and mental development of adolescents in remote areas of the Navoi region of the Republic of Uzbekistan. During 2022-2024, 1147 cases were studied, of which 856 were adolescents aged 17-19 from various educational institutions of the Navoi region, and 291 medical records were analyzed. Objective: Comprehensive study of the influence of socio-hygienic factors on the physical and mental development of adolescents in remote areas and development of correction programs based on modern technologies.

The study was conducted in accordance with the principles of evidence-based medicine and includes the following stages:

1. Analytical stage - retrospective analysis of medical records and documents for the period 2020-2022.
2. Prospective stage - comprehensive examination of adolescents using the developed assessment methods.
3. Intervention stage - implementation and evaluation of the effectiveness of correction programs.
4. Analytical-statistical stage - data processing using machine learning methods.

The study was conducted in stages:

Stage I (2022) - organizational and methodological:

- Development of a research project
- Creation of authorship methods (ITI, ADL-N)
- Test and approve tools
- Training the research team

Stage II (2022-2023) - data collection:

- Retrospective analysis of medical documents
- Prospective examination of adolescents
- Formation of a database

Stage III (2023-2024) - analytical:

- Statistical data processing
- Application of machine learning methods
- Analysis of results and drawing conclusions

Stage IV (2024) - implementation:

- Development of practical recommendations
- Test results
- Preparation for implementation

Thus, the presented research methodology provides a holistic approach to the study of the influence of socio-hygienic factors on the physical and mental development of adolescents in remote areas. This approach combines traditional clinical and epidemiological methods with modern data analysis technologies.

The entry criteria are defined at two levels. The main criteria were mandatory, and only adolescents who met all of them were included in the study. The age restriction corresponds to the final stage of adolescence. The 5-year requirement for the place of residence ensures adequate formation of the influence of the periphery. The requirement of a healthy state excludes the influence of rare diseases. Additional criteria were introduced to improve the quality of the research. The educational criterion allows one to assess the level of intellectual activity. The language criterion reduces errors in obtaining information.

The research sample consists of three main components. The main group includes 856 adolescents from remote areas and is almost evenly distributed by gender (52% boys, 48% girls). The control group consists of adolescents living in the city and serves as a comparison with the main group. The retrospective component allows for the analysis of data from previous years. The total sample size is 2.3 times greater than the minimum amount required to ensure statistical reliability and strength.

2. Results

The territorial composition of the sample reflects the actual demographic distribution of the Navoi region, however, methodological adjustments are necessary to ensure the reliability of the conclusions. Although a large number of participants in developed regions is common in such studies, it may limit the possibility of summarizing the results for the entire region. Statistical significance: Differences in regional representation are statistically significant ($\chi2 = 234.7$; $p < 0.001$), which confirms the need for a differentiated approach to data analysis. The main statistical conclusions showed that this is an uneven regional representation, i.e., a significant imbalance: from Navbad - 3.8% to Karmana - 18.2% with a coefficient of variation of 42.3%, which indicates a significant variability. Three leading districts (Karmana, Kyzyltepa, Khatyrchi) accounted for 48.9% of the total sample.

When comparing the relationship with demographic characteristics, the presence of a direct relationship between the number of participants and population density. Areas with a high population density (>15 people/km2) provided 67% of the sample, sparsely populated peripheral areas are not sufficiently represented, and the influence of the geographical factor. There is an inverse relationship between distance from the center and the number of participants. Districts within a radius of 100 km from the regional center made up 71% of the sample. Participants' maximum distance - 160 km (Konimex).

In conclusion, the coverage of all administrative districts of the region, restrictions: disproportionate representation can affect the generalization of results. The territorial structure of the sample reflects the actual demographic distribution of the Navoi region, but requires methodological adjustments to ensure the reliability of the conclusions. The concentration of participants in developed regions is common for such studies, however, this may limit the generalization of results for the entire region. Differences in regional representation are statistically significant ($\chi2 = 234.7$; $p < 0.001$), which confirms the need for a stratified approach to data analysis.

3. Conclusions

1. Social and hygienic conditions in remote regions have a complex multifactorial effect on the physical and mental development of adolescents, forming a specific pattern of the body's adaptive responses.
2. Limited access to quality medical services and preventive measures in remote areas leads to increased prevalence of functional disorders and chronic diseases among the adolescent population.
3. Unfavorable housing and living conditions, including the quality of drinking water, the sanitary state of dwellings, and the availability of utilities, are statistically significantly correlated with indicators of adolescents' physical development.
4. Socio-economic factors such as family income levels, parents' education, and professional employment are key determinants of mental health and social adaptation of adolescents in remote regions.
5. The climatogeographical features of remote territories necessitate the development of specialized approaches to organizing physical education and recreational activities for adolescents, taking into account seasonal fluctuations and extreme weather conditions.
6. It is necessary to develop a comprehensive interdepartmental program for the medical and social support of adolescents in remote regions, including telemedicine technologies, mobile medical teams, and a remote health monitoring system.

REFERENCES

[1] Baranov A.A., Kuchma V.R., Sukhareva L.M. Assessment of Children's Health Status. New approaches to preventive and health improvement work in educational institutions. Moscow: GEOTAR-Media, 2022. 432 p.

[2] Velichkovsky B.T. Ecological Human Physiology. Human adaptation to extreme environmental conditions. Moscow: Academy, 2021. 512 p.

[3] Vishnevsky V.A., Petrova N.N. Socio-hygienic aspects of public health formation in remote regions of Russia // Hygiene and Sanitation. 2023. Vol. 102. No. 3. P. 215-221.

[4] Grebnyak N.P., Fedotova O.M. Regional Features of Physical Development of Children and Adolescents // Russian Pediatric Journal. 2022. No. 5. P. 89-95.

[5] Denisov E.I., Stepanyan I.V. Occupational health in the Arctic: physiological and hygienic aspects // Occupational Medicine and Industrial Ecology. 2023. Vol. 63. No. 4. P. 234-240.

[6] Efimova N.V., Mylnikova I.V. Environmentally Determined Diseases and the State of Public Health in Regions of Environmental Distress // Bulletin of SB RAMS. 2022. Vol. 42. No. 2. P. 71-78.

[7] Zhuravleva I.V. Attitude towards health of the individual and society. Moscow: Nauka, 2021. 238 p.

[8] Zaitseva N.V., May I.V., Klein S.V. Assessment of public health risks from exposure to environmental chemical pollutants. Perm: Book Format, 2022. 532 p.

[9] Kuchma V.R., Sukhareva L.M., Rapoport I.K. Population health of children, health risks and sanitary-epidemiological well-being of students // Hygiene and Sanitation. 2022. Vol. 101. No. 12. P. 1319-1325.

[10] Lisitsyn Yu.P., Polunina N.V. Public Health and Healthcare. Moscow: Medicine, 2021. 544 p.

[11] Megorsky V.V., Sergeeva A.S. Medical and Social Aspects of Adolescent Health Protection in the Far North // Human Ecology. 2023. No. 6. P. 12-19.

[12] Onishchenko G.G., Popova A.Yu., Zaitseva N.V. Health risk analysis in the strategy of state socio-economic development. Moscow: Perm, 2022. 738 p.

[13] Rakhmanin Yu.A., Mikhailova R.I. Environment and Health: Priorities of Preventive Medicine // Hygiene and Sanitation. 2023. Vol. 102. 102. No. 5. P. 443-450.

[14] Setko A.G., Setko N.P., Trishina S.P. Hygienic assessment of the influence of social factors on the health of adolescents in rural areas // Hygiene and Sanitation. 2022. Vol. 101. No. 8. P. 862-867.

[15] Unguryanu T.N., Buzinov R.V., Lazareva N.K. Health risk assessment in indigenous peoples of the Arctic: a systematic review // International Journal of Circumpolar Health. 2023. Vol. 82. No. 1. P. 2184138.

Copyright © 2025 The Author(s). Published by Scientific & Academic Publishing
This work is licensed under the Creative Commons Attribution International License (CC BY). http://creativecommons.org/licenses/by/4.0/