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## Evaluation of adolescent child health in the Republic of Kalmykia

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### Abstract

New data on the 15 years development of the health status of adolescent children (10-17 years old) living in the Republic of Kalmykia have been obtained. It is shown that in recent years, there have been negative changes in morbidity indexes. General and primary morbidity of adolescent children has increased substantially. Differences were revealed in the structure of morbidity, depending on the place of residence. Among urban children, the first three rank positions are occupied by the disease of the musculoskeletal system, diseases of eyes and eye appendages, and respiratory diseases; and among rural children, respiratory diseases and diseases of the digestive and endocrine systems. The share of chronic pathology among all health disorders among urban residents is significantly higher than that of rural residents. The article demonstrates expediency of improving the preventive health-saving work among adolescent children in today's educational environment.

**Keywords:** Health; adolescent children; rural and urban schoolchildren; the Republic of Kalmykia.

### Introduction

One of the most sensitive to the environmental factors and the conditions of life of the population groups are children and adolescents; therefore, their different age-sex groups are objects of the study, the observation, and the analysis of health in relation to the environment carried out by foreign experts and scholars [1-3]. The acuteness of the problems associated with the formation of health of foreign children in the teenage stage of development is often associated with low physical activity, nutrition errors, and, consequently, with obesity [4-6].

The urgency of studying the health status of adolescent children in our country is determined by catastrophic decline in the quality and the level of health of the population of the Russian Federation as a whole. Modern Russia ranks 127th in the world in terms of public health [7].

The difficult socioeconomic situation in the last decades in our country is accompanied by the negative dynamics of growth and development of children and adolescents, which to date has led to serious health and social consequences – deterioration of reproductive health services, limited access to vocational training, employment, and decrease in the number of young men fit for military service [8].

A few studies indicate singularities of the endoecological status of urban and rural children, which manifest themselves in morbidity and physical development of children and adolescents [9,10]. All this has determined the scientific and practical importance of regional assessment of the health status of adolescent children in the Republic of Kalmykia, characterized by a complex set of environmental problems. We found the following the most important: to study the dynamics of the health status of adolescent children in the Republic of Kalmykia in the period between 2000 and 2013; to provide comparative evaluation of patterns of the morbidity structure among rural and urban adolescent children; to assess the impact of certain social characteristics on the formation of the adolescent children's health.

### Methods

Analysis of parameters of the state republican statistics was carried out using the data contained in the report forms #12, #13, #19, #30, #31, #61 in the annual collections of statistical data on the activities of pediatric services in the Republic of Kalmykia, as well as in the annual collections "Kalmykia in figures" for the period between 2000 and 2013 [11]. The analysis of official

statistical reporting was conducted with account to the whole children population, depending on age, gender, and place of residence (urban/rural) and of birth. The article takes into account the diseases registered with patients who have such a diagnosis for the first time. A survey of school-children was carried out in two stages: during the autumn 2012 and the spring 2013 [12]. The representative sampling to obtain reliable results is not less than 350 children at the age of 10-17 years.

Processing of the results of the studies included: a retrospective analysis, grouping by attributes, construction of analytical tables, the graphical method; calculation of relative values (extensive and intensive values, indexes); calculation of the average values of the dynamics (the absolute growth, the gain, and the growth rate). The plausibility of the various indicators was determined by the Student's *t*-test; the significance level was considered valid at  $P < 0.05$ .

## Results and Discussion

The Republic of Kalmykia is characterized by a complex set of environmental problems. Despite the lack of powerful sources of pollution, the problem of air, water, soil, food, and food raw materials contamination with harmful chemicals remains urgent for Kalmykia. Local sources of anthropogenic pollution have negative impact on the environment, but, because of the limited scope of their influence, do not lead to catastrophic consequences. A particular problem is the cross-border pollution. Great contribution to the pollution of the environment is made by the Kalmykia's neighboring regions due to their well-developed industry (the Volgograd, Astrakhan, Stavropol regions, and Dagestan). In these regions, as well as in Kalmykia in the past, they extensively used pesticides, including

organochlorine and mineral fertilizers, and that has resulted in contamination with these substances of drinking water sources and soil [13].

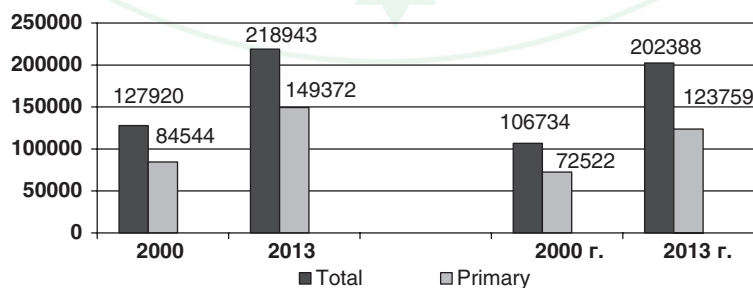
Currently, there are more than 20 environmental diseases validly associated with the effect of adverse environmental factors [14].

Analysis of official statistical reporting (Figure 1) revealed that for the period between 2000 and 2013, the levels of total and primary disease increased among children under the age of 14 years (by 71.2% and 76.7%, respectively), and among the 15 to 17 years old children (by 89.6% and 70.6%).

The accelerated growth of the primary morbidity among children under 14 years points to the unfavorable trend of increase in the rate of overall morbidity among adolescent children. Among children of all ages, the overall incidence of diseases of the blood and blood-forming organs, the circulatory system, the musculoskeletal system, the connective tissue, and the urogenital system has increased most noticeably (3-5 times in the group of children under 14 and 4-7 times in the group of 15 to 17 years old children). In addition, there was 2- to 3-fold increase in the overall incidence of diseases of the digestive system and the endocrine system among children under the age of 14.

By the primary disease indexes, the increase in the frequency of diseases of the musculoskeletal system and connective tissue and blood and blood-forming organs is most noticeable (there is 4- to 5-fold increase among children under the age of 14, and 5-fold increase children under the age of 15-17). In addition, for the group of children under the age of 14, the primary incidence of the endocrine system pathology increased 1.7 times, of the circulatory system diseases – 6 times, of the genitourinary system diseases – 5 times. The accelerated growth of individual classes of diseases identified changes

**Figure 1: The overall and primary morbidity of children at the age of 0-14 years and 15-17 years per 100000 children of the respective age.**



in their rank distribution in the overall structure of morbidity. The share of diseases of the circulatory system, the digestive system, and the genitourinary system has significantly increased. Among older adolescents (15-17 years), the rank position of diseases of the musculoskeletal system and the connective tissue, the endocrine system, eyes and the adnexa has increased considerably. Significant increase in the frequency of certain classes of pathology was caused by the increase in the prevalence of certain groups of diseases – anemia, pathology of the gastroduodenal area and the biliary tract, the hay fever, and the bronchial asthma. For separate classes and groups of diseases, the incidence growth rate is ahead of the increase in the pathology frequency, which has adverse prospects with respect to further significant increase in the prevalence of relevant diseases.

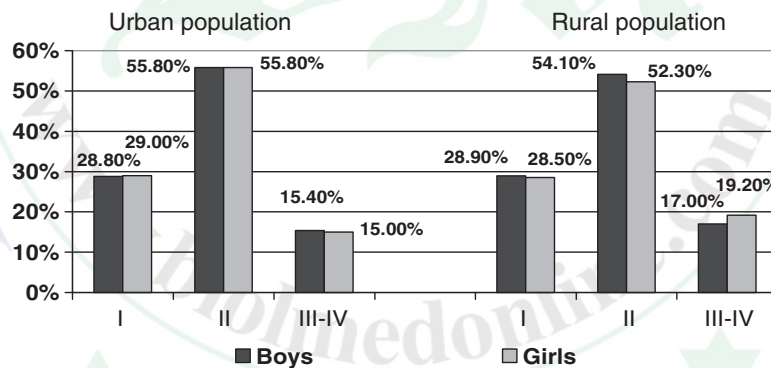
Analysis of the reporting form #31 (preventive medical examinations of schoolchildren) showed that, during the analyzed period, there was permanent growth of the frequency of auditory, visual, speech disorders, and scoliosis among 10 to 14 years old children, and the

increasing frequency of scoliosis among 15 to 17 years old children. It was stated that, in the course of education, the frequency of scoliosis, disorders of visual acuity and hearing sharply increases from 10 to 17 years of age, which is most probably caused by the mismatch of the learning environment to the safety standards.

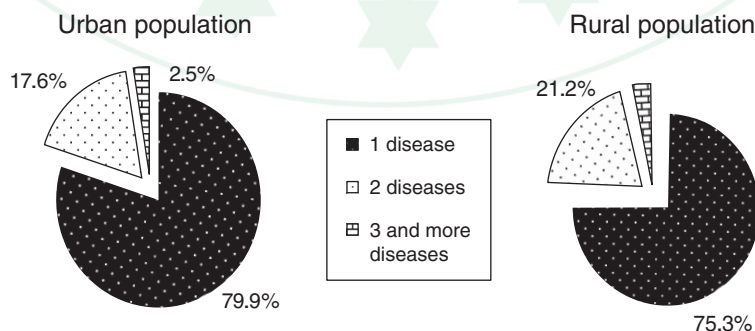
When analyzing the results of the indepth complex medical examination of adolescent children, we found out that only 30% of the total number of examined children were healthy (the health group I). Children with functional abnormalities (the health group II) accounted for more than 55% of adolescents and the remaining 15% of children were the children with chronic diseases (the health groups III-IV). At that, the number of healthy children (the health group I) was higher among the young adolescents (29.7%), while in the group of older adolescents, it was much lower (27.0%), which indicates that the condition of children’s health deteriorates as they mature (Figure 2).

In publications, there are few studies dedicated to study and assessment of living conditions and the health status of rural

**Figure 2: Distribution of adolescent children (10-17 years old) by the health groups depending on gender and place of residence.**

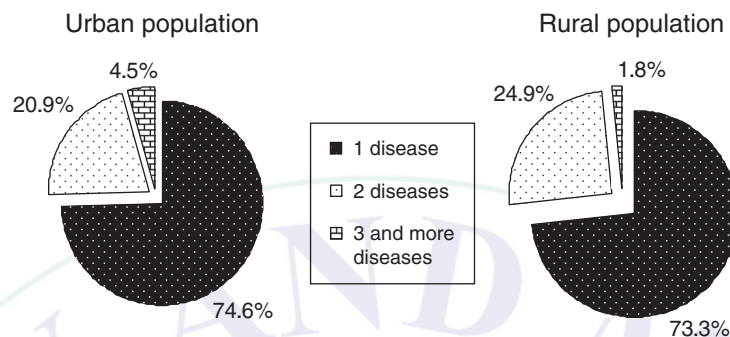


**Figure 3: The number of revealed health disorders among young adolescents (10-14 years old).**

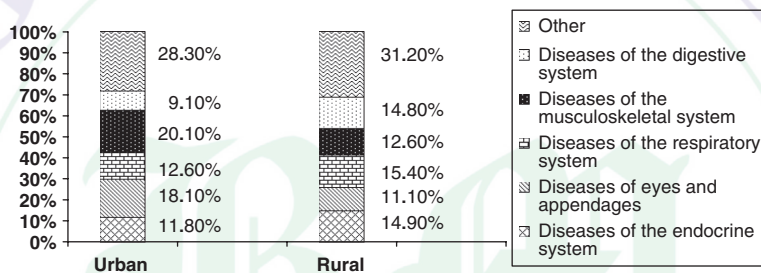




**Figure 4: The number of revealed health disorders among older adolescents (15-17 years old).**



**Figure 5: The structure of the revealed pathology among 10 to 17 years old children depending on residence.**



schoolchildren [13-15]. It also notes the strong influence of negative socioeconomic and environmental factors on the organisms of rural schoolchildren.

According to our findings, the number of children living in the city (boys and girls) is validly higher among children with functional disorders. At the same time, the number of children with chronic diseases is validly higher among rural residents than among those living in the city (Figure 3).

The share of children with chronic diseases (the health groups III-IV) is higher in the older adolescent group (15-17 years) than among 10 to 14 years old children; their share is 18.8% compared to the younger group relevant by age (14.4%).

Among ill young adolescents residing in the city, the number of persons with a single disease is higher (79.9%) than among rural residents (75.3%). The number of children with two or three diseases was significantly higher among residents of rural areas (Figure 3). It was equal to 24.7% versus 20.1% among urban residents.

Evaluation of morbidity among older adolescents (15-17 years) revealed that the share of ill urban children who have a single disease was 74.6% versus 73.2% of rural children. The

share of patients ill with two diseases is also higher among rural children. And the share of children with three or more diseases is much higher among urban than rural children (Figure 4).

Analysis of the structure of pathology revealed that the first three ranking places among urban children are occupied by the diseases of the musculoskeletal system, the diseases of eyes and appendages, the respiratory diseases (20.1%, 18.1%, and 12.6%, respectively), and among rural children – by the diseases of the respiratory, endocrine, and digestive systems (15.4%, 14.9%, and 14.8%, respectively) (Figure 5).

### Conclusion

The differences identified between the younger and older adolescents, as well as between the children living in urban and rural areas can be attributed to the significant difference in the diagnostic and treatment capabilities and healthcare facilities, and in the greater efficiency of medical aid rendered to urban adolescents than to the rural ones, and with different levels of sanitation and environmental conditions, lack of health knowledge and low efficiency of the system of

prevention and medical surveillance of children of different ages.

Human activity is largely determined by the prevailing long-term cultural traditions of the community, in which the individual grows and receives education, and in which the older generations have lived. The set of cultural traditions of the society also includes healthcare traditions in practice. These traditions were formed and they evolved and changed during the historical process by various endogenous and exogenous factors. Currently, the problem of studying the ethnic health is becoming very important. In the context of this, it seems urgent to use innovative teaching methods, which should focus on taking care of the health of children and youths who are the genetic, cultural, and professional potential of the nation. This, in turn, requires developing scientific and methodological support of environment-oriented and health-protecting education and parenting with regard to regional and ethnic singularities of the students. The combination of methods of the environmental analysis of the population's living conditions in a particular region with different levels of pressure of the arid climate conditions with the methods of assessing the socioeconomic conditions of the children's and young people's life will help classify the environmental and physiological characteristics of students at learning in schools and educational institutions. At that, it is possible to identify the weak links of the adaptation mechanisms of the growing organism and to determine the ways of correction and rendering help to children and youths. The prenatal approach to the problems of health and diseases at examination of the healthy and almost healthy people will allow determining the risk of disease development by assessing the adaptive capacities of the organism. Elucidation of the physiological mechanisms of adaptation of children and youths to the educational environment with account of the socioeconomic and extreme climatic factors of Kalmykia can serve as a basis for development of science-based models of the schoolchildren's health protection.

### Summary

Analysis of the adolescents' health state dynamics in the Republic of Kalmykia for the period between 2000 and 2013 showed that the levels of total and primary incidence of diseases increased among both children under the age

of 14 (by 71.2% and 76.7%, accordingly), and among the 15 to 17 years old children (by 89.6% and 70.6%).

The chronic diseases' share among all health problems of adolescent children is just 11.2%. At that, the share of chronic disease among the identified abnormalities of children living in the city is 27.3%, and among children from rural areas – 11.6%.

Comparative assessment of the morbidity structure for rural and urban adolescent children showed a greater degree of influence of social conditions on the formation of the adolescent children's health.

It is necessary to develop scientific and methodological principles of health-protecting education and training with regard to regional and ethnic singularities of the students.

### Acknowledgment

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