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**THE PROBLEM OF STUDYING THE ADAPTIVE SYSTEMS OF  
 CHILDREN'S BODIES UNDER THE INFLUENCE OF  
 ENVIRONMENTAL FACTORS IN THE SOUTH ARAL SEA REGION**

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**ABSTRACT**

*The article analyzes the results of a study of the adaptive systems of the body on the example of the physical development of children under the influence of environmental factors in the South Aral Sea region. The data obtained on the state and growth dynamics of girls make it possible to conclude that they do not have noticeable differences depending on the area of residence. A general regularity was revealed - some lag in the growth of the body of children living in different regions of the Aral Sea region.*

**KEYWORDS:** *Children's population, Physical development, Pesticide load, Environment.*

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**INTRODUCTION**

In the world, the problem of environmental protection in the interests of preserving human health, in particular, reducing the influence of the negative consequences of exposure to harmful factors, remains a fundamental task of environmental research. In recent decades, the state of the air environment, water sources, and soil has become the most ecologically unstable. The quality of human health primarily depends on the quality of the environment in which he lives. The most urgent problems of environmental pollution in industrial centers, where more than 50% of

environmentally hazardous areas are concentrated. The most serious consequences of the Aral Sea catastrophe can be considered as the pollution of the natural environment under the influence of anthropogenic factors, which has led to widespread salinization of soils used in agriculture.

The main factors that transform the natural environment are a decrease in water supply to the territory, an increase in land salinity and a general aridization of conditions. The reason for the activation of these processes over the past 30 years was the coincidence of poor regulation of the water use system and the rapid increase in the scale of land use.

The drying up of the Aral Sea has changed the climatic situation in the region. Initially, the Aral Sea was a kind of temperature and humidity regulator [4, 5]. The main elements of the climate that determine the intensity of physical evaporation, transpiration, the degree of moisture, the recurrence of droughts, and the deflation of sandy loamy-sandy substances are air and soil temperature, precipitation, air humidity, drought, and wind. The dried-up bottom of the Aral Sea now extends over 4.5 million hectares. Two thirds of this area is salt marshes, saline sands and soils. According to experts, the drained bottom of the Aral Sea has turned into a powerful source of salt and dust removal. From this area, in all directions from the Aral Sea, annually up to 75 million tons of sand and dust are carried out. In recent years, there has been an increase in dust storms in the region by 4-10 times [2, 10]. At the same time, a significant part of aerosols of marine origin is contained in the atmosphere layer up to 1000 m; above 2500 m, such particles are practically absent. As you know, the smallest particles of salt and dust at low speeds can be transported over long distances, and larger particles fall out at a short distance from the source of removal [2].

### **THE MAIN FINDINGS AND RESULTS**

In the soils of Karakalpakstan, organochlorine pesticides are detected mainly hexachlorocyclohexane (HCH). From a soil sample contaminated with pesticides, 10 indigenous cultures of microorganisms - active destructors of HCH were isolated and a series of experimental works was carried out to identify the ratio of the isolated crops to various concentrations of lindane (250, 500, 750, and 1000 mg / l). It was found that the maximum amount of pesticides (by assortment) was used in 1990 (41 items), the lowest amount in 1992 (13 items in total). The most intensive use of pesticides in Karakalpakstan was observed in 1987. Then more than 3 thousand tons of 100% of the active ingredient were introduced into the external environment [6, 9].

As you know, physical development is one of the indicators of the health of the child population. Growth and body weight indicators are an important indicator of the physical development of children and adolescents [3, 8]. They are used to assess and interpret the health status of the child population. The growth and development of children remain the main indicators of their health status. Changes in growth processes, the ratio of the child's body weight and length, growth arrest are the main or even the only manifestations of chronic diseases [3]. At the same time, the physical development of children serves as the basis for predicting pathology.

Despite numerous studies on the problems of studying the adaptive systems of modern children, however, a number of issues were not discussed, or were not considered comprehensively, in a narrow range of ontogenesis. In recent years, most of the works of modern researchers are

devoted to the physical development of children [1, 8], and the results of complex functional studies are much less represented.

The physical development of children and adolescents is currently being studied in various directions, and one of the topical problems continues to be the study of its features in unfavorable environmental conditions of residence, for example, in the Southern Aral Sea region. The least studied are the issues of individual variability of growth processes. At the same time, the study of the physiology of growth seems to be very important, especially in the case of deviations from the average indicators of body length, since lagging, and sometimes acceleration of growth rates can be the only symptoms of a fairly wide range of diseases [7].

The term “physical development” is usually understood as a complex of functional indicators, which determines the stock of physical strength of the body and its functional reserves [1, 3]. With regard to children, the concept of physical development should be expanded by assessing the processes of growth and development of the body, therefore, physical development in this case is understood as a complex of morphological and functional signs that characterize the age level of a child's biological development. There are two known periods of increasing growth rate: the first falls on the period from 4 to 7 years, the second - at a later period: for girls 10-11.5 years old, and for boys 13-15 years old. The first increase in the growth rate is called the half-growth jump the second is called the pubertal jump [3, 8].

A significant increase in body weight in boys and girls is noted during puberty. During this period (from 10 to 15 years old), the body weight of girls is greater than the body weight of boys, and from 15 years old, the rate of weight gain in boys is higher. Boys experience the most intense weight gain between 4-5 and 12-15 years of age. In girls, the most intense weight gain is observed between 4-5 and 10-11 years. The data of official statistics and scientific research indicate that negative trends in the change in demographic indicators in the Republic of Uzbekistan, including the health status of the child population, persist.

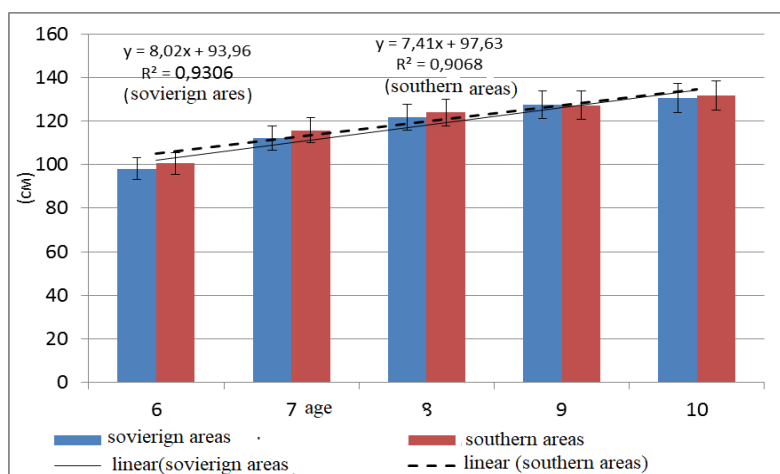
The least studied is the nature of the manifestation of the morphological and functional characteristics of the development of children with different growth rates living in different regions of the South Aral Sea region (by the example of the Republic of Karakalpakstan), which is characterized by a peculiar ecological background. Knowledge of the individual capabilities of a child and predicting his ontogenesis is a necessary prerequisite for successful education and upbringing without prejudice to health.

It is known that linear, volumetric and other parameters of an organism are closely related to its functional characteristics. Parameters such as height, body weight, age and gender are the argument, and the basal metabolic rate is their function [1]. Therefore, it is very important to know the dynamics of height and weight - the main indicators of a child's development.

When analyzing the annual anthropometric indicators, we came to the following results. At the age of 6, regardless of where they live, girls are slightly lower than the standard values (Fig. 1). As can be seen from the diagram, the growth of girls 6-8 years old from the southern regions slightly exceeds the growth of girls from the northern regions. The trend line is also similar for the two groups of indicators. The normative data are 111-120 cm, and in relation to them, the growth of girls is less by 4 and 6%, respectively, in the indicated areas. The increase in body length by the age of 7 was 7.3 cm, which, although it is within the limits of the existing norms, in

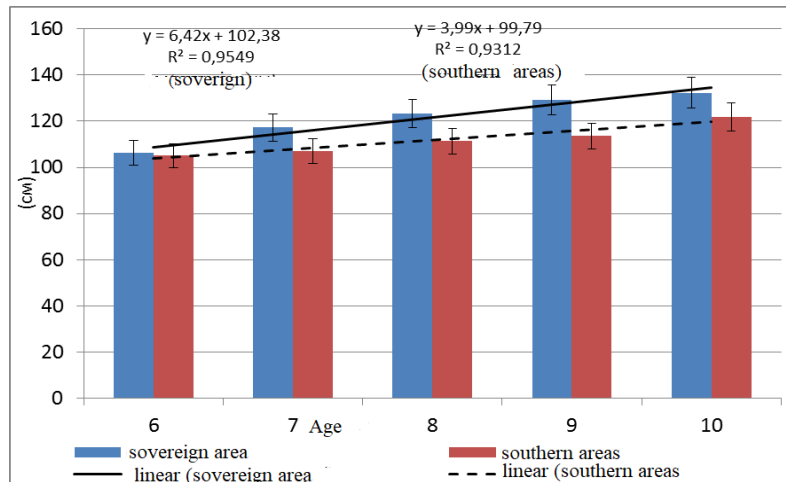
spite of this, the growth of the body still remains closer to the lower limit of the physiological norm. The indicated dynamics persists annually throughout the analyzed period of the growth of children, i.e. all years up to 10 years. By this age, the lag in body length in relation to the standard values was 4 and 6%, respectively, in the two surveyed groups.

The data obtained on the state and growth dynamics of girls make it possible to conclude that they do not have noticeable differences depending on the area of residence. There is a general pattern - some lag in the growth of the body. The body length values of girls correspond to the minimum standard age indicators (Fig. 1). The annual increase in body length also corresponds to the lower limit of the norm. Probably, in this regard, attention should be paid to the height values of girls at 6 years of age. With normative values from 111 to 120 cm, the indicators for the southern regions are lower by 4%, and for the northern regions - by 6%.



**Fig. 1 Growth rates of girls (cm) living in different areas South Priaralie ( $M \pm m$ )**

The obtained values of the height of boys from 6 to 10 years old are presented in Fig. 2, from which it follows that they are somewhat lower than the existing normative ones. As can be seen from the diagram, the most pronounced lag is traced among children born and living in the southern regions (group 2). As for boys from group 1 (northern regions), there are no noticeable differences in years between them. Growth retardation is traced as a general pattern and ranges from 5 to 8% (respectively). As for the value of the annual increase in body length, it is for children from the northern regions within the existing age norms, and for boys from the southern regions, it is mainly below it. By the age of 10, the body length of boys from the southern regions is below the standard by 13% and less than the minimum value - 141.8 cm (norm 155-170 cm).



**Fig. 2. Growth rates of boys (cm) living in various regions of the Southern Aral Sea region ( $M \pm m$ )**

Attention is drawn to the initial inconsistency of the body length in boys with the existing norms, that is, by the age of 6. The gap was 13% in the southern regions and 7% in the northern regions, respectively.

## CONCLUSION

Summarizing the data obtained on the anthropometric indicators of children from different regions of the Southern Aral Sea region, which differ in the degree of environmental pollution, it can be noted that there are no significant differences in gender in the development of body length between children from the northern regions of Karakalpakstan. Boys from the southern regions are an exception. They have deviations in growth, which is below the average values of the norm by 13-16% (from other regions by 4-9%). A possible reason for this is the fact that the value of the annual body gain at the age of 7, 8 and 9 years is less than the existing normative ones.

The very dynamics of the processes of growth and development of children from different regions of the Aral Sea region differs little from each other and from the normative indicators, corresponding to their low values. The existing differences in age values from the normative ones are related, in all likelihood, to the peculiarities of the early period of ontogenesis, which lead to the above characteristics of the growth and body weight indicators of children and adolescents born and living in the Aral Sea region. When developing modern problems of adaptation and solving problems in the field of preserving the health of the younger generation, at least a three-dimensional assessment system is needed, which should include medical and biological, environmental and social criteria.

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