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Abstract- An epidemiological assessment of the structure and dynamics of the incidence of iron deficiency anemia in the Republic of Uzbekistan from 2007 to 2019 was carried out. The study showed that, according to WHO standards, in the Republic of Uzbekistan during the period under study, it was possible to achieve the transition of the category of significance of the Iron Deficiency Anemia (IDA) problem for public health from medium (prevalence 20.0–39.9 %) to moderate (5.0–19.9 %)... In some regions, where in 2007 the prevalence of anemia was more than 40 % for 12 years, it was possible to achieve a transition to the category of medium significance. However, the national average is still far from acceptable (4.9 %), which makes it necessary to continue and deepen preventive and health-improving measures.

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Epidemiologic Analysis of the Prevalence of Iron Deficiency Anemia in the Republic of Uzbekistan for 2007-2019

Gavkhar J. Jarylkasinova [α] & Iskandar. R. Mavlyanov [σ]

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I. Introduction

Iron deficiency anemia (IDA) is a widespread pathology among population, according to data presented by World Health Organization (WHO) this disease has been ranked as one of the most common among the 38 most widespread human diseases [1, 4]. As you know, IDA is more common in developing countries than in developed ones. For example, in India, up to 88% of pregnant women and 74% of non-pregnant women suffer from anemia, in Africa - about 50% of pregnant women and 40% of non-pregnant women. In Latin America and the Caribbean, the prevalence of IDA in pregnant and non-pregnant women is about 40 % and 30%, respectively [7,13,18] .

The incidence of IDA is 20%, and iron deficiency (ID) exists in 50 % of the population in the population [2, 3]. ID is the most common malnutrition in the world affecting many children and women in developing countries, and the only type of nutritional deficiency that is also prevalent on a large scale in industrialized countries [8]. At the same time, according to statistics in the world, about 50% of preschool children and pregnant women suffer from IDA [10].

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ID and IDA reduce the labor productivity of the population, lead to serious economic consequences and create obstacles to the development of the country. Invisible but pervasive in many developing countries, the true consequences of ID and IDA are hidden behind statistics on overall mortality rates, maternal bleeding, poor school performance and reduced work ability. The health consequences are latent but destructive, imperceptibly weakening the potential for the development of people, society and the national economy [1,6,7,10] .

According to the grading of WHO experts, the prevalence of IDA in the population can be moderate - from 5 to 19.9%, average - from 20 to 39.9%, and significant - 40% or more [1, 7.18]. When the prevalence of anemia is more than 40%, the problem ceases to be only medical and requires measures at the state level. A similar situation was observed in the Republic of Uzbekistan, one of the developing countries of Central Asia, where in the mid-90s the incidence rate of IDA in some regions was much 40%. In this regard, the country began to carry out preventive and health-improving measures, the first results of which appeared already in 2006-2007 [5,9] .

Despite the fact that work in this direction began to give results, the incidence rate in some regions remained high and presented a significant problem for the country's health. The following years were characterized by significant changes in the structure and operation of the health care system, which became more focused on the prevention of diseases. In this regard, the main objective of this study was evaluation of the structure and dynamics of the incidence of IDA in the Republic of Uzbekistan from 2007 to 2019.

II. Materials and Research Methods

The study was performed in the department of Hematology of Bukhara branch of the Tashkent Medical Academy. The research materials were the data of official statistical reporting, accounting and reporting documentation, information and analytical materials collected for the period from 2007 to 2019. The material was collected as a result of work with the Ministry of Health of the Republic of Uzbekistan, as well as regional, city and district health departments in regions

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of the country. Particular emphasis was placed on the analysis of the epidemiological situation in the Kashkadarya, Bukhara and Navoi regions, as well as separately in the Republic of Karakalpakstan.

The study was comprehensive in nature using descriptive and analytical epidemiological techniques, retrospective epidemiological analysis, and medical statistics.

Statistical analysis included with the used of the district and merge data into a single computer database. During processing, we used the computer packages STATISTICA and BIOSTAT. For analysis were used both parametric and non-parametric methods. For quantitative indicators mean values, standard errors, and standard deviations were calculated. The trend lines were drawn to predict further morbidity with the calculation of the approximation reliability (R^2) .

III. Results

The considered time period was characterized by an increase in the total population from 26 million to 31 million inhabitants [14].

The dynamics of the absolute number of cases of anemia among the population was not so even during the first 3 years, only since 2010 a steady decline in the number of cases from 5.6 million to 4.1 million in 2017 began. At the same time, in the period from 2007 to 2018 in the country, the average annual population growth was equal to 1.45%, while the average annual regression rate of anemia in the entire population was 0.81% (Fig. 1).

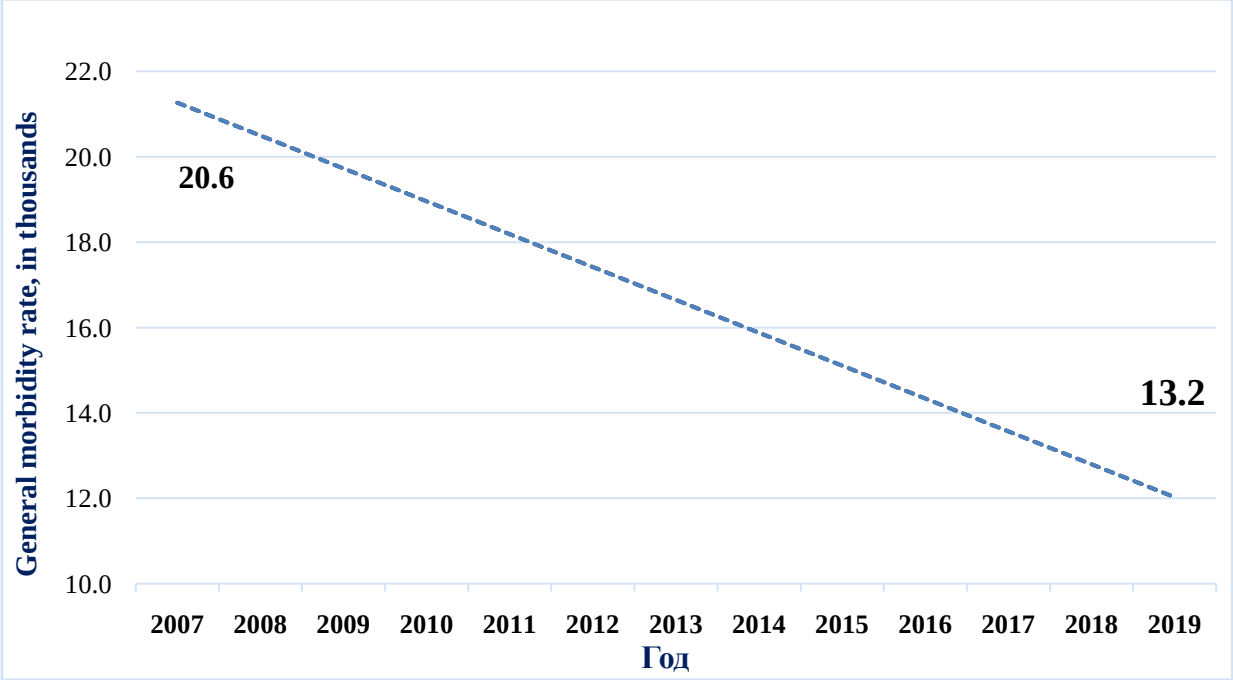


Figure 1: Dynamics of the overall incidence rate from 2007 to 2019.

Analysis of indicators of general and primary illness rates per 100,000 population in the Republic of Uzbekistan for the period from 2007 to 2019 is shown in Figures 2 and 3 . The graphs show that there has been a significant decline in both indicators.

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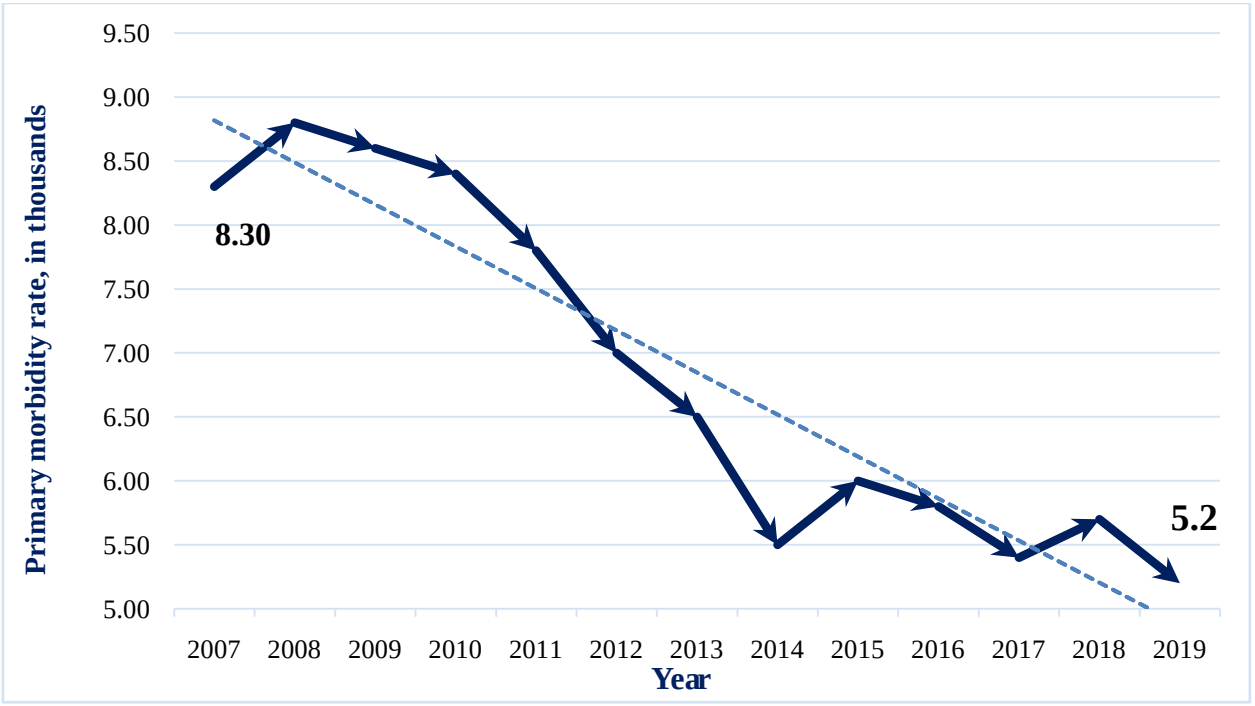


Figure 2: Dynamics of the primary incidence rate from 2007 to 2019.

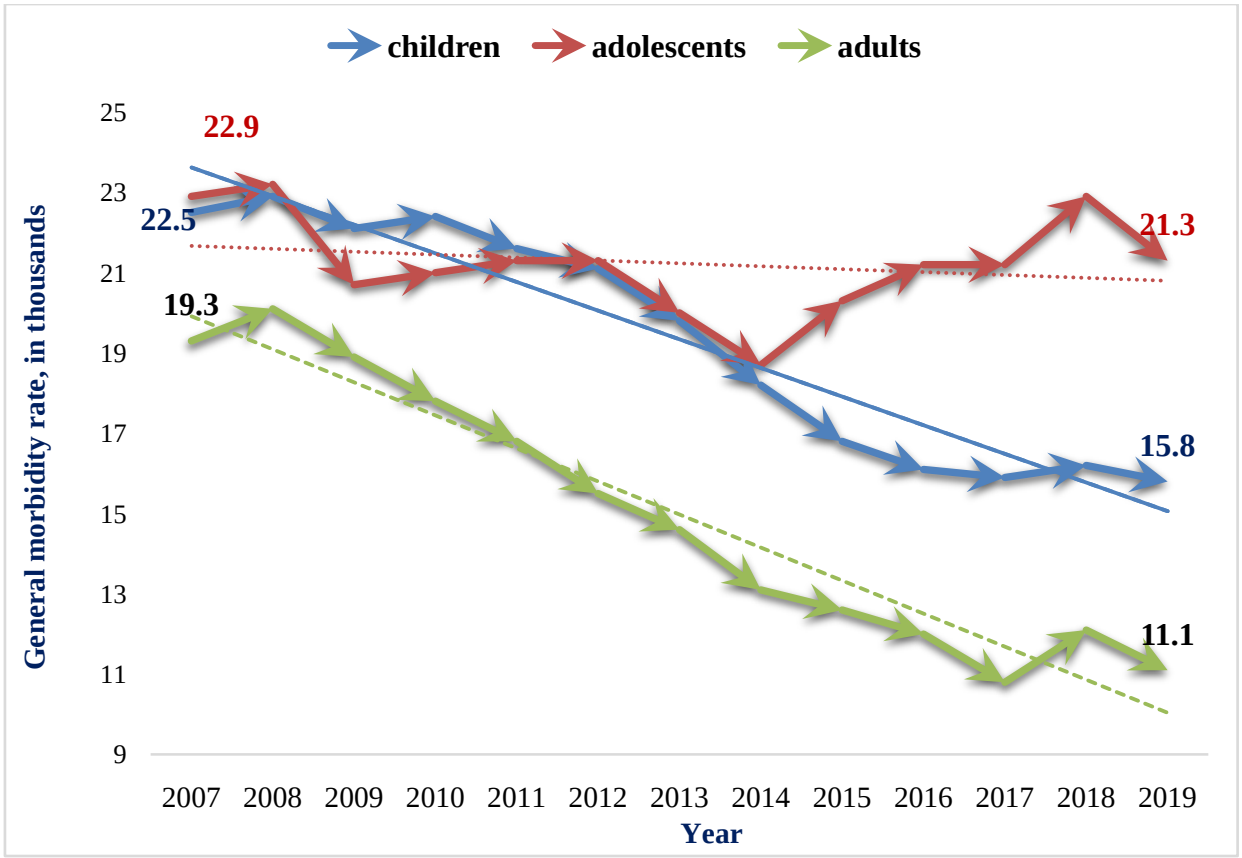


Figure 3: Dynamics of indicators of the general incidence of anemia per 100,000 in different age groups.

The overall incidence rate was 20,620 per 100 thousand population, after a slight increase in the rate in 2008, its stable decline began, which continued until 2017. In 2018, there was a slight increase in the overall incidence of up to 13,837 cases per 100 thousand population. Nevertheless, the graph shows that over 12 years there has been a decrease in the overall incidence rate by almost 33%. At the same time, on average, there

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was a decrease in the indicator by 816 cases per 100,000 population annually ($R^2 = 0.9517$).

Analysis of the primary incidence rate showed that in 2007 it was 8.3 thousand cases per 100 thousand population. In 2008, there was an increase in the rate to almost 9 thousand cases, after which over the next 6 years there was a decrease, which reached its lowest point in 2014 and amounted to 5.5 thousand cases. Over the next 4 years, periods of rise and decline alternated until in 2019 the primary incidence rate reached the final mark of 5.2 thousand cases. These graphs show that over 12 years there was a decrease in the indicator by more than 30% with an average annual regression equal to 343 cases ($R^2 = 0.8729$).

The analysis of dynamic changes in the incidence rate of IDA in individual age groups is presented in Figure 4.

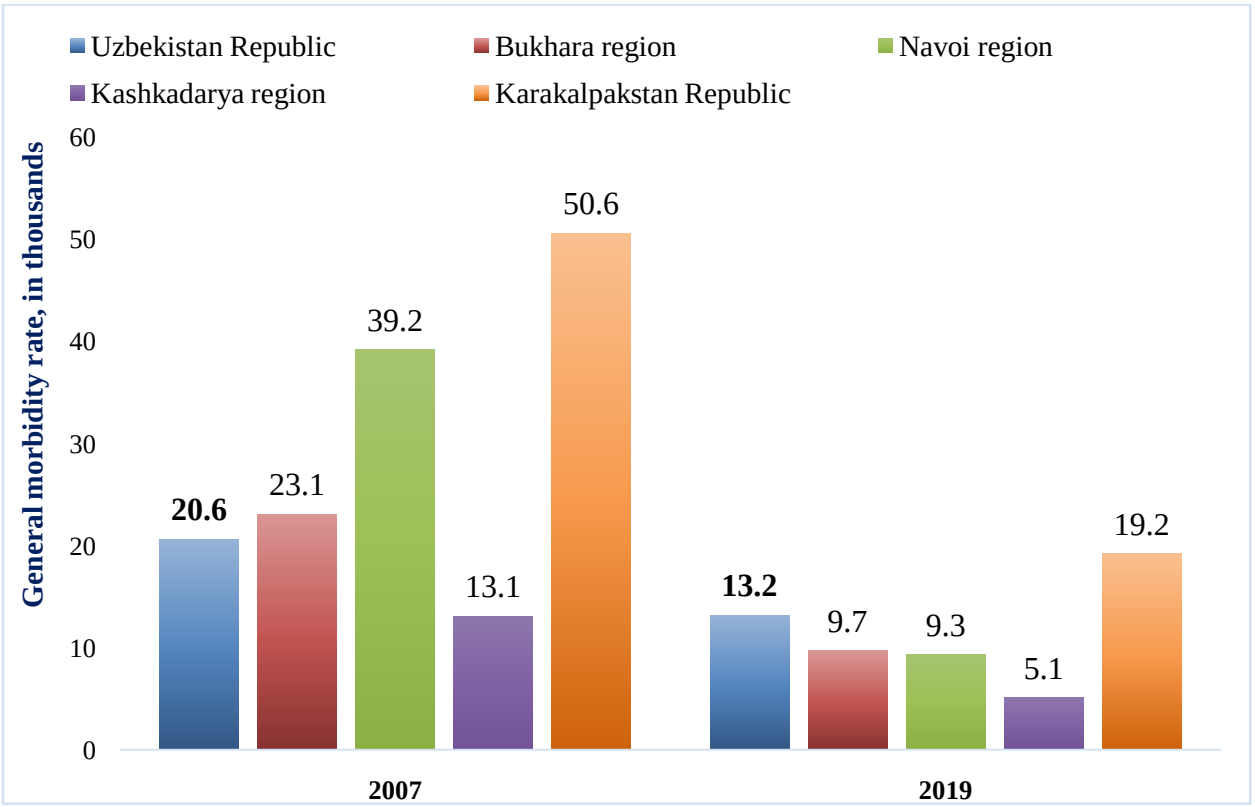


Figure 4: The indicator of the overall incidence of IDA per 100 thousand of the population in the most problematic regions and the whole Republic as a whole for 2007 and 2019.

It can be seen from the graph that consideration of the overall incidence rate per 100,000 population, depending on the age group, shows significantly higher numbers in children (under 14 years of age) and adolescents (15-17 years old) compared to the adult population. So in 2008, the total incidence of anemia was 22657 per 100,000 children, and 22,973 cases per 100,000 adolescents. In adults, this figure was 19347 cases. After increasing rates in 2008, the overall incidence in children and adults declined steadily over the next 9 years. In children, over the past period, there was a decrease in regression of the indicator by 28%, while in adults by 37%. At the same time, the average value of the annual regression was almost 750 cases in children ($R^2 = 0.9211$) and almost 870 cases ($R^2 = 0.947$) in adults per 100,000 population.

The dynamics of the general morbidity in the age group of adolescents during the specified period did not have a stable trend. The graph shows that during the first 3 years there was a significant decrease in incidence from 23% at the beginning to almost 20% in 2009. Over the next 3 years, there was a slight increase in the rate, which was replaced by a sharp decline over the next 2 years, when in 2014 the lowest rate was recorded equal to almost 19,000 cases per 100,000 adolescents. However, during the last 4 years of follow-up, there was a second increase in the rate, which in 2018 even surpassed the original rate of 2008 and amounted to 22,993 cases per 100,000 adolescents.

An analysis of the overall incidence rate per 100,000 population in the regional aspect is shown in Figure 4. Statistical data from Bukhara, Navoi and Kashkadarya regions, as well as the Republic of Karakalpakstan, were taken for the study, since these regions were considered the most problematic in terms of IDA prevalence for many years. The graph shows that in 2007 the overall incidence rate of IDA per 100,000 population in the Republic of Karakalpakstan was more

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than 2 times higher than the national average and amounted to 50.6 thousand cases. The indicators of the Navoi region were also almost 2 times higher than the national average, amounting to 39.2 thousand, while the incidence in the Bukhara region was only slightly higher, equal to 23.1 thousand. Only the indicators in the Kashkadarya region were 13 in 2007, 1 thousand, which was significantly lower than the national average of 20.6 thousand.

If we analyze similar data for 2019, it becomes clear that, like a decrease in the average indicator for the whole of Uzbekistan as a whole, there has also been a significant decrease in these regions. In all 4 regions, over the past 12 years, there was a decrease in the overall morbidity rate by more than 2 times compared to 2007. At the same time, in the Republic of Karakalpakstan and Navoi region, a regression occurred by 57% and 75 %, respectively. The data for 2019 suggests that only the indicators of the Republic of Karakalpakstan (21.6 thousand) significantly exceed the national average (13.8 thousand), while in other regions they are lower.

IV. Discussion

The prevalence of IDA among the population is an indicator that largely depends on socio-economic factors, since its development is associated with a lack of iron and other important nutrients in the body, that is, the quality of nutrition [8]. In this regard, the analysis of its dynamics makes it possible to understand the vector of development not only of health care, but also of other aspects of state life. The Republic of Uzbekistan is a developing state, in which a demographic growth of about 20% was observed over the 12 years studied. However, despite a significant increase in the population, the absolute number of IDA cases among the country's population over the past period has decreased by more than 26%. This regression shows that, in general, there has been significant progress in the country, associated not only with the improvement of methods of treatment and prevention of IDA, but also with a number of socio-economic changes in the life of the country.

The dynamics of the most important epidemiological indicators, indicators of general and primary morbidity showed that over the past period they decreased by 33% and 30%, respectively, while the value of the approximation reliability (R^2) in both cases was quite high, which provides a basis for statistics to expect further continuation of the regression of morbidity.

However, it should be noted that consideration of the dynamics of morbidity in separate age groups showed that adolescents (15-17 years old) did not show a general trend towards a stable regression over the studied time interval, and in 2018 the indicator turned out to be slightly higher than the initial one. Earlier in Exposure to extreme th incidence of IDA adolescents may be due to several reasons. Earlier it was shown that among the factors contributing to the development of IDA, in this age group are "growth spurt " , chronic blood loss (prolonged and abundant menstruation) and inappropriate nutrition [11, 12, 15, 16] .

Regional features of IDA prevalence were represented by higher morbidity rates in Navoi region and the Republic of Karakalpakstan, where in 2007 this pathology was found in almost every second inhabitant. Over the past 12 years, in these regions, a significant decrease in incidence rates has been achieved, however, in the Republic of Karakalpakstan, the rates are still almost 2 times higher than the average rates throughout the country.

In general, if we turn to the recommendations of the WHO [1 7,18], in the Republic of Uzbekistan for the period from 2007 to 2019 it was possible to achieve the transition of the category of importance of the IDA problem for public health from the average (prevalence 20.0-39.9 %) moderate (5.0–19.9 %). In some regions, where in 2007 the category of the problem was significant (≥40 %), over 12 years it was possible to achieve a transition to the category of medium importance. Nevertheless, the national average is still far from normal (4.9 %), which necessitates the continuation and deepening of preventive and health-improving measures.

V. Conclusion

Thus, the conducted epidemiological study showed that in the period from 2007 to 2019 in the Republic of Uzbekistan it was possible to achieve a significant regression of the incidence rates of iron deficiency anemia. However, in certain age groups, in particular among adolescents, the prevalence of the disease remains high, which requires the development of a new approach to treatment and prevention measures in them. Also, the analysis of regional features of the incidence of iron deficiency anemia shows that in some regions it is much higher than in the country as a whole, which requires a deeper study of pathology in a given area, the dynamics of its growth and factors that contribute to it.

Conflict of Interest

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article and report on the contribution of each author.

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