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DYNAMICS ANALYSIS OF THE MEASLES INCIDENCE RATE AMONG THE POPULATION OF UKRAINE IN THE PERIOD FROM 2015 TO 2021

Introductions: With the outbreak COVID-19 pandemic, the European Regional Verification commission for Measles and Rubella Elimination (RVC) convened its 9th session (Copenhagen, Denmark, 29 June, 17 September, 5–6 November and 14 December 2020) and was able to evaluate the status of measles transmission during 2019 in Member States of the Region [1, 2].

The RVC noted that the regional diversity of measles virus genotypes has been decreasing, which is consistent with global trends and progress towards reaching the regional elimination goal even with the COVID-19 pandemic creating an extraordinary burden on health systems. According to The WHO Regional Office for Europe measles incidence rates in Ukraine have changed the most significantly between 2015 and 2021 [3-7].

Aim: To analyze the dynamics of measles incidence and evaluate the effectiveness of immunization of the infection in Ukraine for 2015-2021.

Materials and methods: The annual reports of the Public Health Center of the Ministry of Health of Ukraine on certain infectious and parasitic diseases were analyzed; annual reports on the implementation of vaccination in Ukraine for the period from 2015 to 2021; materials of the WHO RVC (the WHO generalized reporting form on measles cases in Ukraine for the period from 2015 to 2021); WHO RVC reports on the profile of Ukraine in the perspective of measles elimination.

Results and discussion: Analysis of the data showed that the incidence of measles in the period from 2015 to 2021 has varied significantly. Thus, in 2015 it amounted 0.24 per 100 thousand population (105 cases). In that year it was represented a RVC decrease in the incidence rate and predicted a fixation with a small discrepancy in the indicator in the measles

incidence rate. As it was predicted, the measles incidence indicator in 2016 was 0.24 (102 cases per 100,000 population). The Ministry of Health of Ukraine assured the stability of the infectious process and expected the trend to decrease. But in 2017 there was a massive outbreak of measles infection.: the incidence rate was 11.23 per 100 thousand population (4782 cases). Thus, there was an increase in 46.8 times.

The incidence rate in 2018 increased significantly and amounted to 125.47 per 100,000 population (53,219 cases). That is compared to last year the incidence of measles increased 11.13 times. Next year, 2019, was marked by a relative stabilization of the epidemic process: the incidence rate was 135.69 per 100,000 population (57,282 cases), which was only 7% higher than the previous one.

Since the beginning of 2020, the whole world has experienced the COVID-19 pandemic. Its consequences have affected all aspects of human life including the intensity of infectious diseases. Thus, in 2020 there was a significant decline in the incidence of measles infection: it was 0.63 per 100,000 population (264 cases), which was 215 times lower than last year.

Thus, due to the infection control COVID-19 measures there was a decrease in the activity of the epidemic process not only of the SARS virus - CoV – 2 but also the measles virus. This was reflected in the incidence rates: in 2021 the incidence of measles was 0.04 per 100 thousand population (16 cases), which was 10 times less than the previous year.

Data on the incidence of measles infection in the period from 2015 to 2021 are given in (table. 1) and (table. 2).

Table 1

Incidence of measles among the population of Ukraine in 2015-2021, absolute indicators

Year						
2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
105	102	4782	53219	57282	264	16

Table 2

Incidence of measles among the population of Ukraine in 2015-2021, an intensive indicator per 100 thousand population

Year						
2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
0,24	0,24	11,23	125,47	135,69	0,63	0,04

According to the Public Health Center of the Ministry of Health of Ukraine on the vaccination coverage against measles, rubella and mumps vaccine (MMR) in Ukraine, the circumstances for the formation of a layer of non-immune to the measles pathogen were noted. Since 2015, the percentage of MMR vaccinations in Ukraine has begun to decline. Thus, in 2015, 63.2% were vaccinated and only 62.1% were revaccinated. In 2016, these figures were already 45.5% and 30.2%, respectively. Thus, for the next 5 years, a layer of non-measles-free children was formed. However, the scale of vaccinations increased further: in 2017, the percentage of MMR vaccinations in Ukraine was 93.3%, revaccinations - 90.7%; in 2018 - 91.0% and 89.5%; in 2019 - 93.2% and 91.7%; in 2020 - 83.3% and 83.4%; in 2021 - 88.5% and 86.8% respectively. Data on the dynamics of the intensive incidence of measkes infection in the period from 2015 to 2021 are shown in (Figure 1).

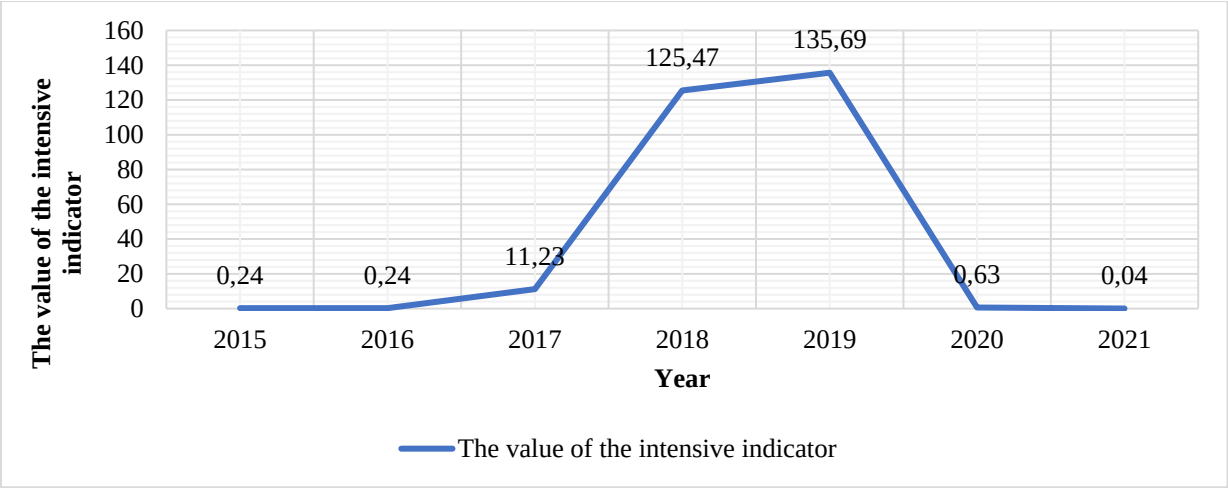

Fig. 1. **Dynamics of intensive measles incidence among the population of Ukraine in 2015–2021.**

Conclusions: In Ukraine, the incidence of measles infection in the period from 2015 to 2021 was noted mostly as a phenomenon of "star flare". A significant increase in incidence tate in 2018 indicates the characteristic cyclicity that is inherent in measles infection. This is speeded by the low level of coverage with preventive vaccinations and the formation of a significant layer of non-immune to pathogens.

During the COVID-19 pandemic in 2020 and 2021, there was a significant declone in the level of measles case registration. This was probably due to the introduction of a set of restrictive and anti-epidemic measures to eliminate and prevent COVID-19, which had a cross-reactive effect and appeared in the epidemic process of measles infection. In addition, the low level of measles registration may be connected to the fact that patients were less likely to seek help during the quarantine period due to limited access to medical services and increased burden on the health care system during this period.

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