

## Measles outbreak in the Republic of Uzbekistan

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### Keywords:

Measles, virus genotypes, vaccination, national immunization days.

### Abstract

The article presents the results of the epidemiological analysis of the measles outbreak in the Republic of Uzbekistan in 2018-2020, as well as the results of the mass immunization of children against measles. As a result of the national immunization days with the measles and rubella (MR) vaccine in November-December 2022, 98.4% of children aged 6 months to 5 years were vaccinated against measles.

### 1. Introduction.

Prior to the introduction of the measles vaccine, major measles epidemics occurred every 2–3 years, causing 2.6 million deaths each year [1,2]. In 1963, after the introduction and widespread vaccination the level of population immunity approached 55% and it was believed that one dose of measles was enough to interrupt its spread, but the ratio of sick adults to children continued to be 1 to 8.9 [3].

In 1987, measles revaccination was introduced; as a result, the number of cases of morbidity and mortality from measles has sharply decreased.

Despite the fact that measles has been a manageable infection for a long time, recently the incidence of measles has increased dramatically around the world, so in 2019 there were the highest rates of morbidity and mortality from this infection in the last 23 years. WHO notes that the number of cases from 2016 to 2019 increased to 869,770 cases, and the number of deaths from this infection reached 207,500 [4,5].

In connection with the spread of various diseases of a bacterial, viral and any other nature, the immune layer of the vaccinated population is weakening, which again contributes to the emergence of these diseases. It reveals the necessity of national immunization days.

According to WHO, failure to vaccinate children against measles with two doses of vaccines promptly, in some cases - refusal to vaccinate are the main

reasons for the burst of the incidence of measles infections.

**Objective.** To study the epidemiological features of the outbreak of measles infection in the Republic of Uzbekistan.

### 2. Materials and methods.

Statistical data and materials on the incidence of measles infection of the Service of Sanitary and Epidemiological Welfare and Public Health of the Republic of Uzbekistan were used for the epidemiological analysis. Epidemiological research methods and operational epidemiological analysis were applied.

### 3. Results and discussion.

Active epidemiological surveillance of the state of measles incidence has been carried out in Uzbekistan since 2012. In 2017, Uzbekistan received a WHO certificate for the elimination of measles in our Republic.

However, in 2018, 179 measles patients were registered in the Republic of Uzbekistan, 22 cases were laboratory confirmed [6], of which 4 were imported from the Russian Federation, Turkey, Saudi Arabia and Kazakhstan.

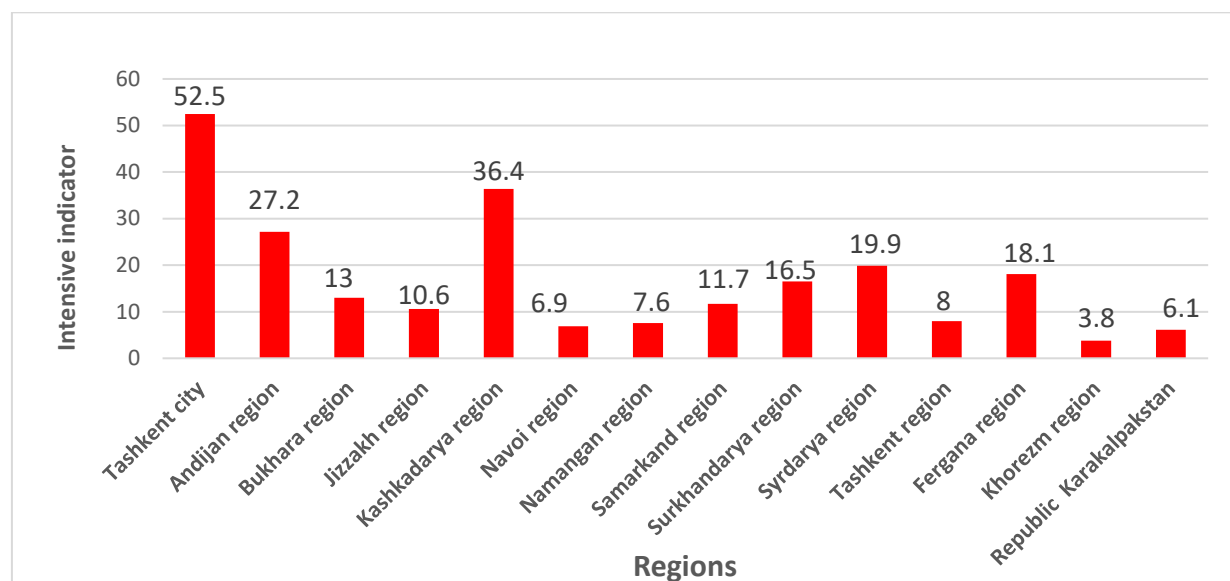
In 2019, measles cases began to be reported, classified as resulting from endemic transmission of the virus.

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An analysis of the daily measles situation showed that the measles outbreak started in December 2019 and the peak incidence was registered in March in all regions of the republic.

Since January 2019, despite ongoing anti-epidemic measures, 4,127 measles patients have been

registered. 1686 blood samples of suspicious patients were delivered to the virological laboratory of the Sanitary and Epidemiological Welfare and Public Health Service and the analysis of 686 samples was positive, which accounted for 16.6%. The increase in the incidence of measles continued in 2020 (Fig. 1)



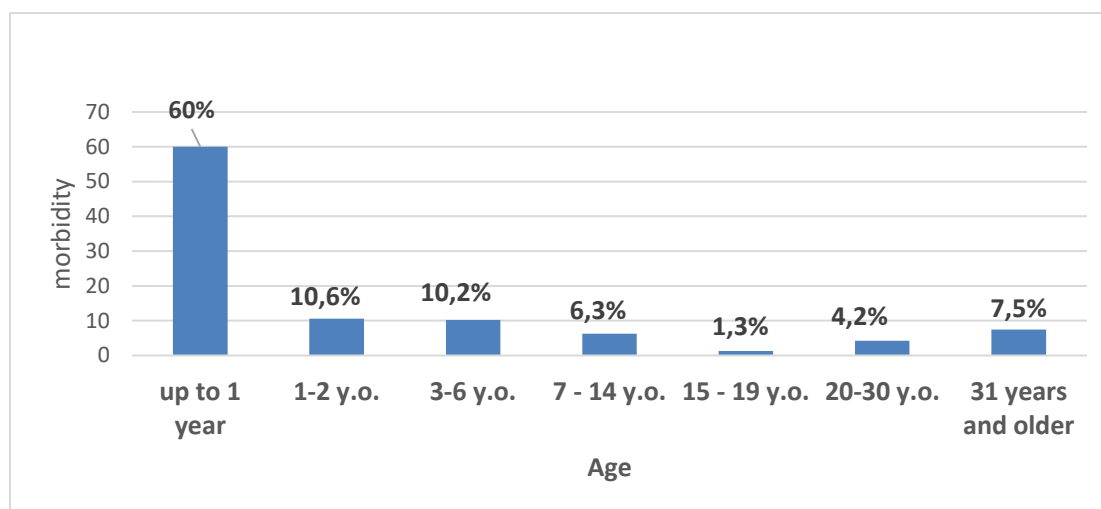
**Figure 1** Measles incidence in the Republic of Uzbekistan (from January 1 to 2020, int.)

As we can see from this figure, cases of measles were recorded in all regions of Uzbekistan. The largest number of registered cases of measles in 2020 was in the city of Tashkent (52.5 cases), then in Kashkadarya region (36.4), Andijan region (27.2), Syrdarya (19.9), Fergana (18.1), Surkhandarya (16.5) regions.

Despite the ongoing anti-epidemic measures and vaccination of contacts in measles foci in Samarkand, Kashkadarya and the city of Tashkent, the unfavorable epidemic situation for measles continued and the incidence among children under the first year of life increased (Fig. 2). Nosocomial infections with measles in children were registered in the city of Tashkent and in other regions (in Kashkadarya,

Syrdarya, Samarkand, Fergana, Bukhara, Tashkent). There was an increase in registered cases of measles in Andijan, Fergana, Namangan and Navoi regions. Deaths from complications of measles among children of the first year of life were registered in February (Tashkent).

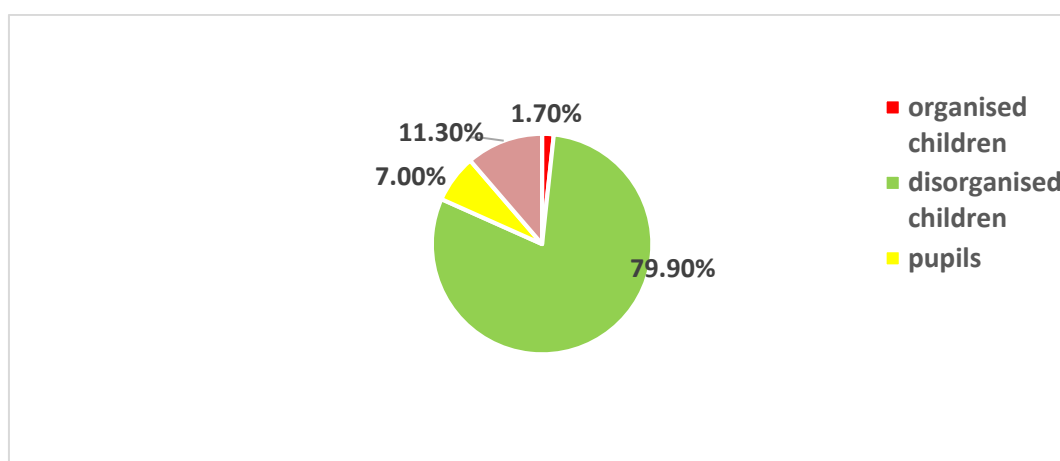
The highest percentage of measles incidence in Uzbekistan (60%) occurred in children under 1 year old, 10.6% and 10.2% of cases were accounted in children from 1-2 years old and 3-6 years old, respectively, 6.3% of cases were accounted in children 7-14 years old. There were also cases of measles among people 20-30 years old (4.2%) and over 31 years old (7.5%).



**Figure 2** The incidence of measles in the Republic of Uzbekistan in terms of age (2020, in %)

In study of the social composition of patients with measles infection, it was revealed that 79.9% of patients are unorganized children (Fig. 3), i.e. children who do not attend preschool institutions (first of all,

these are children who have not reached vaccination age and children aged 1 to 5 years). In second place are adults - 11.3% and in third place - children of school age (pupils) (7%).



**Figure 3** Measles incidence among the population of Uzbekistan by social groups (2020, %)

The causes of the epidemiological outbreak of measles in Uzbekistan were identified. The main reason for the epidemic trouble in the republic was the importation and circulation of a wild virus (genotypes D8, B3 and B4), which affects children of unvaccinated age and once vaccinated children.

Clinical material (samples of nasopharyngeal swabs and urine) were sent for genotyping to the WHO Regional Reference Laboratory (RRL) for the diagnosis of measles and rubella in Moscow (Research Institute of Epidemiology and Microbiology named after G.N. Gabrichevsky), where importation into Uzbekistan of measles viruses of the

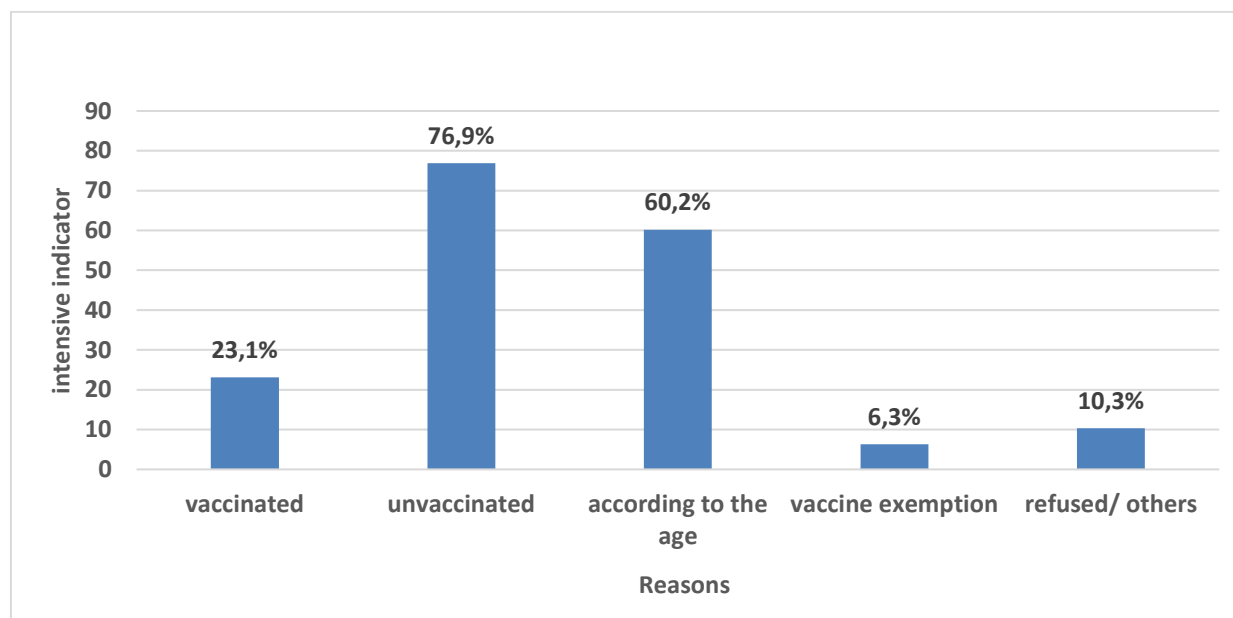
D8 genotype was confirmed, the circulation of which has been registered since 2016 in many countries of the world.

In addition, measles virus genotypes were detected in clinical samples from other regions of the republic: in samples from the city of Tashkent - in 4 samples (D8 5485); Tashkent region - in 5 samples (D8 5485); Kashkadarya region - in 5 samples (D8 6057); Navoi region - in 4 samples (D8 5485, B3 5287, B3 Kabul 4298); Ferghana region - in 3 samples (D8 5485); Jizzakh region - in 1 sample (D8 5485); Surkhandarya region - in 1 sample (D8 6057).

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The causes of epidemic trouble also include medical exemptions, refusal to vaccinate and migration of the population. The risk group primarily includes children who have not reached vaccination age and who have received only 1 dose of measles vaccination (at 12

months, according to the professional vaccination calendar of Uzbekistan) [8]. 76% of the cases were unvaccinated and only 23.1% were vaccinated individuals (children who are often ill, with weakened immune systems and with chronic diseases) (Fig. 4).



**Figure 4.** Causes of measles incidence among the population of Uzbekistan (2020 in %.)

Unvaccinated young children (under vaccine age), previously unvaccinated pregnant women, and seronegative individuals are most at risk of contracting measles [7].

In December 2020, the Ministry of Health of Uzbekistan asked for help from international organizations: UNICEF Measles Fund, WHO and vaccine manufacturers.

640,000 doses of measles and rubella vaccine (MR) were provided by the Indian Vaccine Institute to help Uzbekistan fight measles. From 10<sup>th</sup> to 20<sup>th</sup> February, a mass immunization campaign was launched in the city of Tashkent, Kashkadarya and Samarkand regions.

In May 2020, Uzbekistan received 3 million 350 thousand doses of measles vaccine (Table 1).

**Table 1.** Order of measles vaccine for national measles immunization days in Uzbekistan (children aged 6 months to 5 years).

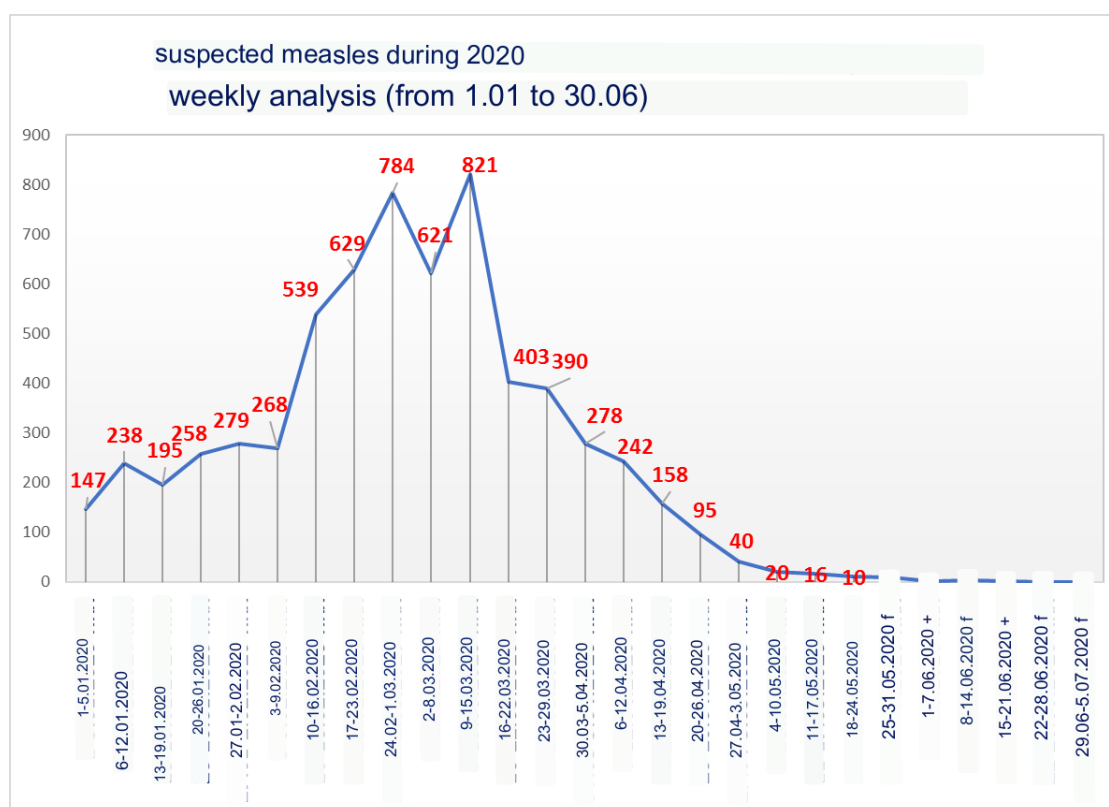
№	Name of regions	Number of doses
1	Tashkent city	120 000
2	Andijan	305 000
3	Bukhara	170 000
4	Jizzakh	145 000
5	Kashkadarya	180 000
6	Navoi	90 000



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7	Namangan	235 000
8	Samarkand	210 000
9	Surkhandarya	290 000
10	Sirdarya	80 000
11	Tashkent region	270 000
12	Ferghana	350 000
13	Khorezm	175 000
14	Republic of Karakalpakstan	170 000
15	Puplic hospitals	10 000
16	Pharmaceutical Committee	900
	Epidemiological Well-Being Service Agency	549 100
	<b>Total for Uzbekistan:</b>	<b>3 350 000</b>

As a result of mass vaccination against measles, the last case was registered in June 2020.



**Figure 5.** Weekly detection of measles cases in the Republic of Uzbekistan (01.01 - 06.30.2020)

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In connection with the large-scale immunization against measles infection in Uzbekistan in 2021, not a single case of measles was registered (Fig. 5).

Vaccination remains the main means of combating this insidious infection.

For the prevention of measles in the Republic of Uzbekistan in November and December 2022, National Immunization Days (NID) were held. All children from 6 months to 5 years (4 years 11 months 29 days) were vaccinated with a two-component MR vaccine (measles, rubella). As a result of the NID, 98.4% of children were vaccinated against measles.

Nevertheless, measles remains a dangerous disease and still ranks 5th in the world among the causes of death in children under 5 years old.

Any person who does not have antibodies against measles is at risk of getting measles and the only way to protect is vaccination.

## 4. Conclusions:

1. The main cause of epidemic trouble in the Republic of Uzbekistan was the importation and circulation of a wild virus (genotypes D8, B3 and B4), which affects children of unvaccinated age and once vaccinated children.
2. 76% of the cases were unvaccinated and only 23.1% were vaccinated individuals;
3. The largest percentage of measles cases in Uzbekistan (60%) was in children under 1 year old;
4. 79.9% of patients are unorganized children, adults are in second place - 11.3%;
5. As a result of the NID conducted in 2022, 98.4% of children in Uzbekistan aged 6 months to 5 years old were vaccinated against measles.

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