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MEASLES VACCINATION COVERAGE AND THE 2023-2024 OUTBREAK IN KAZAKHSTAN: OFFICIAL FIGURES, WHO/UNICEF ESTIMATES, CENTRAL ASIAN COUNTRIES AND REGIONS

Imidkyzy Yasmina
Gymnasium No. 97, Almaty, Kazakhstan

Imidkyzy Yasmina — Student, Gymnasium No. 97, Almaty, Kazakhstan.

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Abstract: Kazakhstan had one of the largest measles outbreaks in Europe and Central Asia in 2023-2024, with 15,111 cases reported to WHO in 2023 and 28,147 in 2024. This study compares what national and international sources say about measles vaccination coverage in Kazakhstan, sets the country beside Kyrgyzstan, Uzbekistan and Tajikistan, and examines how the outbreak differed between regions. National statistics report that 99% of children were vaccinated by the age of two in 2023, whereas the latest WHO/UNICEF estimate (2025 revision) puts first-dose coverage at 69% in 2023 and 62% in 2024. The same estimates gave 99% for 2023 in their 2023 revision; the change follows a 2024 household survey whose use the Ministry of Health disputes. On the current estimates, about 608,000 children born in 2019-2023 had not received the first dose by the age of 12-23 months, before the 2023-2024 catch-up campaign. Across the four countries, coverage does not predict outbreak size: Uzbekistan, at 99% coverage, had 576 cases per million in 2024 and Kyrgyzstan, at 91-96%, 1,991, while Tajikistan, at about 80%, reported none. Within Kazakhstan, official regional figures varied widely: East, North and West Kazakhstan had 38.1, 45.2 and 69.1 cases per 100,000 in 2023, against 149.4 nationally. National averages, of both coverage and cases, hide where susceptible children are, and the disagreement over coverage itself needs to be resolved before coverage can be linked to the outbreak.

Keywords: measles, vaccination coverage, Kazakhstan, Central Asia, WUENIC, outbreak

1. Introduction

Measles is one of the world's most contagious diseases, and "two doses of the vaccine are recommended to ensure immunity and prevent outbreaks" [1]. In January 2024 the WHO Regional Office for Europe reported, on the data then available, that Kazakhstan had "the highest incidence with 13 677 cases in 2023", that 70% of more than 11,300 cases among children under 14 were unvaccinated and that 65% of all cases were children under five [2]. The country's Ministry of Health counted 29,648 cases in 2023 and 31,641 by 9 January 2024, 79% of them children under 14 [3]. In WHO data Kazakhstan reported 15,111 cases in 2023 and 28,147 in 2024 [4].

Earlier work described routine vaccination in Kazakhstan falling at the start of the COVID-19 pandemic and only partly recovering in 2020 [5], characterised the measles viruses circulating during an earlier rise in cases, mostly genotype D8 [6], and drew attention to the rising number of cases in 2023 [7]. What has not been put together is how different sources describe coverage, how Kazakhstan compares with other Central Asian countries, and how the outbreak varied inside the country. This study does that with open data.

2. Hypothesis

Before the data were analysed, the author proposed (7 October 2026) that coverage in Kazakhstan fell because of the COVID-19 pandemic, which paused routine vaccination and made parents afraid of clinics, together with the growth of the anti-vaccination movement, religious motives, false information about vaccines on social media and supply problems, and that Kyrgyzstan and Uzbekistan would show a similar picture while Tajikistan, with a smaller decline, might differ. After the first comparison of countries she wrote (11 October 2026): "My hypothesis turned out to be partly true"; "vaccination coverage alone cannot explain how an infectious disease spreads. Differences in case reporting, the timing of vaccinations, the distribution of unvaccinated people between regions and contact between individuals may also play a role. And even when a country has a high vaccination coverage, areas with low immunity may still be susceptible to outbreaks." The regional part of the study was designed to look at that second idea.

3. Data and methods

Coverage with the first (MCV1) and second (MCV2) doses of measles-containing vaccine was taken from the WHO/UNICEF estimates of national immunization coverage (WUENIC), 2025 revision, for 2015-2025, downloaded from the UNICEF data service on 29 October 2026 [8]. MCV1 coverage refers to children aged 12-23 months. The 2023 revision of the same estimates was read from a UNICEF and WHO media brief [9], and the reasons for the changes from the WUENIC notes for the 2025 revision [10]. Reported measles cases are final WHO figures (Global Health Observatory, indicator WHS3_62, downloaded on 9 October 2026) [4]; population, crude birth rate and infant mortality are World Bank data [11]. The number of children who missed the first dose was estimated, for each birth year 2019-2023, as surviving infants (births minus infant deaths) multiplied by the share not covered by MCV1.

For Kazakhstan, national figures were taken from the Bureau of National Statistics (incidence per 100,000 in 2023 and 2024, and the share of children vaccinated against measles, rubella and mumps by age two) [12] and from the Ministry of Health [3]. Regional case numbers were collected by the author from official releases of regional sanitary-epidemiological departments and the National Centre for Public Health [13-19]. No table with all regions for a full year was found, so the periods and case definitions differ (Table 3); only East, North and West Kazakhstan have a full calendar year for 2023. Incidence per 100,000 was computed with the regional population on 1 May of the same year [20]; for East Kazakhstan the computed 38.1 equals the value given in the source.

4. Results

4.1. Coverage in Kazakhstan by source

The current WHO/UNICEF estimates show MCV1 coverage in Kazakhstan at 96% in 2015, 79% in 2019, 69% in 2023 and 62% in 2024, and MCV2 coverage at 94%, 67% and 59% in the same years (Table 1). These figures were revised heavily. In the 2023 revision, Kazakhstan's MCV1 coverage was 99% in every year from 2015 to 2019 and 99% again in 2023 [9]. The notes to the 2025 revision list a 2024 Multiple Indicator Cluster Survey (MICS) for Kazakhstan among the new surveys used and state that "the Ministry of Health believes the 2024 MICS survey results underestimate true vaccination coverage compared with programme data, and disagrees with its use to inform the WHO/UNICEF estimates"; Kazakhstan was one of two countries with which WHO and UNICEF held a dedicated consultation call [10]. Where there are no data for a year, WUENIC interpolates between earlier and later years [10], so the smooth decline between survey points is an estimate, not a yearly measurement. National statistics for 2023 report that 99.0% of children received the measles, rubella and mumps vaccine by age two [12], and the Ministry of Health reported 94% coverage of one-year-olds for eleven months of 2023 [3].

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Table 1. Measles vaccination coverage, WHO/UNICEF estimates (WUENIC, 2025 revision), % [8]

Country	MCV1 2015	MCV1 2019	MCV1 2023	MCV1 2024	MCV2 2015	MCV2 2023	MCV2 2024
Kazakhstan	96	79	69	62	94	67	59
Kyrgyzstan	99	96	96	91	96	93	94
Uzbekistan	99	98	99	99	99	99	99
Tajikistan	87	83	80	80	84	78	79

If the current estimates are close to the truth, about 608,000 children born in Kazakhstan in 2019-2023 had not received the first dose by the age of 12-23 months, 28.7% of the birth cohort (Table 2). WUENIC does not correct for later catch-up doses [10], and the 2023-2024 supplementary campaign reached 638,549 children aged 2-4 [3], largely the same birth cohorts.

4.2. Coverage and cases in four Central Asian countries

The four countries do not line up. Uzbekistan's MCV1 coverage stayed between 96% and 99%, yet it reported 20,940 cases in 2024, 576 per million. Kyrgyzstan's coverage was 91-99% (91-96% since 2017) and it had the highest rate, 992 per million in 2023 and 1,991 in 2024. Tajikistan, whose estimated coverage was revised to about 80% when its 2023 Demographic and Health Survey was taken into account [10], reported 294 cases in 2023, none in 2024 and 2,246 in 2025, a provisional figure (Table 2). Kazakhstan had the largest estimated unvaccinated cohort and the largest number of cases, but not the highest rate.

Table 2. Estimated children without the first measles dose and reported cases, four Central Asian countries [4, 8, 11]

Country	Children without MCV1 by 12-23 months, born 2019-2023 (estimate)	Share of cohort, %	Cases 2023	Cases 2024	Cases per million, 2023 / 2024
Kazakhstan	608,000	28.7	15,111	28,147	743 / 1,367
Kyrgyzstan	45,000	5.8	7,046	14,380	992 / 1,991
Uzbekistan	52,000	1.2	1,176	20,940	33 / 576
Tajikistan	255,000	19.0	294	0	28 / 0

4.3. The outbreak by region of Kazakhstan

National incidence was 149.4 cases per 100,000 in 2023 and 138.0 in 2024 [12]. All three regions with a full year of data for 2023 were below this average: East Kazakhstan 38.1, North Kazakhstan 45.2 and West Kazakhstan 69.1 (Table 3). Zhambyl region recorded 210.2 cases per 100,000 in the first eleven months of 2023, 5.5 times the rate of East Kazakhstan, and half as many cases in the same months of 2024. In West Kazakhstan the rate rose to 187.5 in 2024. In Karaganda region, 88.2% of patients up to 5 February 2024 had not been vaccinated [16]. The regions with published year-end figures may not be typical, and the largest regions are missing for 2023.

Table 3. Measles by region of Kazakhstan, 2023-2024 [12-20]. * Period shorter than a full calendar year, not comparable with annual rates

Region	Period	Cases (definition in source)	Population, thousand	Per 100,000
East Kazakhstan	2023, full year	278 (confirmed)	729.9	38.1
North Kazakhstan	2023, full year	241 (not specified)	533.2	45.2
West Kazakhstan	2023, full year	477 (not specified)	690.2	69.1
West Kazakhstan	2024, full year	1,302 (not specified)	694.4	187.5
Zhambyl	2023, 11 months	2,567 (not specified)	1221.3	210.2*
Zhambyl	2024, 11 months	1,172 (not specified)	1223.2	95.8*
Almaty city	2024, 1 Jan-25 Jun	3,243 (confirmed)	2249.4	144.2*

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Akmola	1 Jan - 12 Jul 2024	871 (confirmed)	788.6	110.4*
Karaganda	outbreak start (2023) to 5 Feb 2024	415 (lab-confirmed of 596 suspected)	1135.8	36.5*
Kazakhstan	2023 / 2024, full year	–	–	149.4 / 138.0

4.4. Two counts of cases

For 2023 the Ministry of Health counted 29,648 cases [3] and WHO 15,111 [4], a ratio of 1.96. For 2024 WHO and national statistics agree: WHO reported 28,147 cases, and the Bureau of National Statistics rate of 138.0 per 100,000 implies about 28,418 with World Bank population. The 2023 gap therefore looks like a reporting issue specific to that year; the releases used here do not explain it.

5. Discussion

The results support the author's ideas only in part. Her prediction held for outbreaks but not for the mechanism: Kyrgyzstan and Uzbekistan both had large outbreaks, but Uzbekistan had no fall in estimated coverage and Kyrgyzstan only a small one (96% to 91%), while Tajikistan differed, with a smaller estimated decline and few reported cases until 2025. The causes she proposed for Kazakhstan, the pandemic, religious refusals and misinformation, could not be tested with these data. Her second idea, that national coverage alone cannot explain outbreaks and that immunity is distributed unevenly, is consistent with the results: coverage does not order the four countries by outbreak size, and incidence inside Kazakhstan varied several-fold between regions.

The largest open question is the coverage itself. Official figures put coverage near 99%, while the current WHO/UNICEF estimate, based on a 2024 household survey, puts first-dose coverage at 69% and the Ministry of Health disputes the use of that survey [10]. The two figures cannot both describe the same children: on the estimate, about three in ten children of recent birth cohorts had not received the first dose by 12-23 months, enough for measles to spread; on the official figure, the 2023-2024 outbreak would be harder to explain. The author also pointed to differences in reporting as a reason why simple comparisons can mislead, and the two counts of cases for 2023 show the same problem. Publishing coverage by region, from both administrative data and surveys, would show which regions the susceptible children are in.

Limitations. The regional figures come from separate releases with different periods and case definitions, and only three regions have a full year for 2023; regional coverage was not available, so the link between unvaccinated children and regional incidence is not measured. The unvaccinated cohort depends on the WUENIC revision used. Case reporting differs between countries, and Tajikistan's zero cases in 2024 followed by 2,246 in 2025 may reflect reporting as well as real changes in transmission.

6. Conclusion

Whether Kazakhstan vaccinates 99% or about 69% of its children against measles depends on the source, and the latest WHO/UNICEF revision, which the Ministry of Health disputes, places the country among those with large unvaccinated cohorts. Neither coverage figure alone explains the 2023-2024 outbreak or the differences between Central Asian countries, and inside Kazakhstan the outbreak varied strongly between regions. Resolving the coverage disagreement and publishing coverage by region are the steps needed to target catch-up vaccination.

Data availability

All data come from the public sources listed in the references. The regional table, the analysis script and the downloaded data are available from the author or her mentoring team on request.

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Author contributions and use of AI tools

The author chose this research direction from three proposed by her mentor, proposed the hypothesis and the interpretation quoted in Section 2, and found the official regional case data with their sources. The national and international data were collected and analysed and the text was drafted by her mentor with the help of a generative AI assistant (Claude, Anthropic).

Conflicts of interest

The author declares no conflicts of interest. No funding was received for this study.

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