Т. 12. №9 2026
https://doi.org/10.33619/2414-2948/130

UDC 616.914-036.22 https://doi.org/10.33619/2414-2948/130/35

EPIDEMIOLOGICAL TRENDS OF VARICELLA (CHICKENPOX) IN AZERBAIJAN: ANALYSIS OF REGISTERED CASES FROM 2000 TO 2024

©***Valizada S.***, *ORCID: 0009-0008-6368-061X, Nakhchivan State University, Nakhchivan, Azerbaijan, saidavalizada@ndu.edu.az*
©***Valizada Kh.***, *ORCID: 0009-0004-0067-4619, Independent researcher, Nakhchivan, Azerbaijan, velizadexelil5@gmail.com*

ЭПИДЕМИОЛОГИЧЕСКИЕ ТЕНДЕНЦИИ ЗАБОЛЕВАЕМОСТИ ВЕТРЯНОЙ ОСПОЙ В АЗЕРБАЙДЖАНЕ: АНАЛИЗ ЗАРЕГИСТРИРОВАННЫХ СЛУЧАЕВ С 2000 ПО 2024 гг.

©***Вализада С.***, *ORCID: 0009-0008-6368-061X, Нахчыванский государственный университет, г. Нахчыван, Азербайджан, saidavalizada@ndu.edu.az*
©***Вализада Х.***, *ORCID: 0009-0004-0067-4619, Независимый исследователь, г. Нахчыван, Азербайджан, velizadexelil5@gmail.com*

Abstract. Varicella (chickenpox) remains a significant public health issue worldwide, especially in countries with incomplete vaccination coverage. This study examines the incidence of varicella in Azerbaijan over a 25-year period from 2000 to 2024. The data show an overall increasing trend in reported cases, with notable peaks in 2022 and 2023, reaching incidence rates of 412.4 and 281.7 per 100,000 people, respectively. A temporary decrease in cases was seen in 2020, likely due to public health measures during the COVID-19 pandemic. These fluctuations highlight the changing nature of varicella transmission and emphasize the urgent need for comprehensive immunization strategies. The findings indicate that increasing vaccination coverage and enhancing surveillance systems are essential for controlling varicella outbreaks and reducing disease burden in Azerbaijan. This study offers valuable epidemiological insights that can guide public health policies and support improved prevention and management of varicella in the region.

Аннотация. Ветряная оспа (ветрянка) остается серьезной проблемой общественного здравоохранения во всем мире, особенно в странах с неполным охватом вакцинацией. В данном исследовании изучается заболеваемость ветряной оспой в Азербайджане за 25-летний период с 2000 по 2024 год. Данные показывают общую тенденцию к росту числа зарегистрированных случаев с заметными пиками в 2022 и 2023 годах, когда показатели заболеваемости достигли 412,4 и 281,7 на 100 000 человек соответственно. В 2020 году наблюдалось временное снижение числа случаев, что, вероятно, связано с мерами в области общественного здравоохранения во время пандемии COVID-19. Эти колебания подчеркивают меняющийся характер передачи ветряной оспы и указывают на острую необходимость в комплексных стратегиях иммунизации. Полученные результаты свидетельствуют о том, что расширение охвата вакцинацией и совершенствование систем надзора имеют ключевое значение для контроля вспышек ветряной оспы и снижения бремени болезни в Азербайджане. Данное исследование предоставляет ценные эпидемиологические данные, которые могут лечь в основу политики в области общественного здравоохранения и способствовать улучшению профилактики и контроля ветряной оспы в регионе.

Keywords: Varicella, Chickenpox, Incidence, Azerbaijan, Varicella-Zoster Virus.

Т. 12. №9 2026
https://doi.org/10.33619/2414-2948/130

Ключевые слова: ветряная оспа, заболеваемость, Азербайджан, вирус ветряной оспы — опоясывающего лишая.

Varicella, commonly known as chickenpox, is an acute contagious disease caused by the varicella-zoster virus (VZV) [1]. It primarily affects children but can occur at any age, and is characterized by a generalized vesicular rash accompanied by fever and malaise [1, 2].

While generally self-limiting, varicella infection can lead to serious complications, especially in immunocompromised individuals, pregnant women, and adults [3].

Epidemiological surveillance of varicella is essential for understanding its disease burden, guiding vaccination policies, and implementing effective public health interventions [4].

Globally, the incidence of varicella has declined in regions with established varicella vaccination programs; however, in countries without widespread immunization, the disease remains endemic and a significant public health concern [5]

In Azerbaijan, varicella remains a prevalent infectious disease with variable incidence across regions and age groups. Despite the introduction of some immunization initiatives, comprehensive national-level data and trend analyses spanning multiple years are limited. This study aims to analyze the epidemiological trends of varicella infection in Azerbaijan from 2000 to 2024, providing critical insights into the disease's dynamics to support public health planning and control strategies.

Materials and Methods

This retrospective epidemiological study analyzed varicella incidence data collected from the national health surveillance system of Azerbaijan between 2000 and 2024. Data included the total number of reported varicella cases stratified by year, age group, and region. The population denominator for incidence rate calculations was based on official census data provided by the State Statistics Committee of the Republic of Azerbaijan. Cases of varicella were defined according to the national case definition criteria, which include clinical diagnosis based on characteristic vesicular rash and epidemiological linkage [6].

Data quality and completeness were verified by cross-referencing regional reports with the national database.

Incidence rates were calculated as the number of reported cases per 100,000 population per year. Descriptive statistics were used to summarize temporal trends and demographic distributions. Trend analysis was performed using Joinpoint regression to identify significant changes in incidence rates over the study period [7].

All statistical analyses were conducted using SPSS version 25.0 (IBM Corp., Armonk, NY, USA) and Joinpoint Regression Program version 4.9.1.0 (National Cancer Institute, USA). Ethical approval for the study was obtained from the Azerbaijan Ministry of Health Ethics Committee. As the study used anonymized secondary data, informed consent was waived.

Results

Incidence of Varicella (Chickenpox) in Azerbaijan from 2000 to 2010. Varicella, commonly known as chickenpox, is a highly contagious viral disease caused by the varicella-zoster virus (VZV). Monitoring the incidence of varicella is crucial for public health planning and vaccination strategies. This study analyzes the registered cases of varicella in Azerbaijan over the period from 2000 to 2010.

The number of reported varicella cases showed a general increasing trend during this period. In 2000, 2,044 cases were registered, corresponding to an incidence rate of 26.0 cases per 100,000 population. The incidence rate peaked in 2009 at 86.3 cases per 100,000, with 7,615 reported cases. Following this peak, a slight decrease was observed in 2010, with 6,963 cases (77.9 per 100,000

Т. 12. №9 2026
https://doi.org/10.33619/2414-2948/130

population). These findings highlight fluctuations in varicella incidence, emphasizing the need for continuous surveillance and effective public health interventions, including vaccination programs, to control the spread of the disease in Azerbaijan.

Table 1

INCIDENCE OF VARICELLA (CHICKENPOX) AMONG THE POPULATION IN AZERBAIJAN (NUMBER OF REPORTED CASES)

2000	*2005*	*2007*	*2008*	*2009*	*2010*
2.044	5.162	6.293	4.982	7.615	6.963
Number of registered varicella (chickenpox) cases per 100,000 population					
26,0	61,6	73,1	57,1	86,3	77,9

Incidence of Varicella (Chickenpox) in Azerbaijan from 2011 to 2015. Between 2011 and 2015, the incidence of varicella continued to show significant variation. In 2011, there were 10,448 reported cases, resulting in an incidence rate of 115.4 cases per 100,000 population. The number of cases decreased in 2012 to 8,745 (95.3 per 100,000) but rose again in the following years, peaking in 2014 with 13,919 cases, equivalent to 147.8 cases per 100,000 population. By 2015, the incidence slightly declined to 11,645 cases (122.2 per 100,000). This fluctuating trend indicates ongoing challenges in varicella control and highlights the importance of sustained public health efforts, including vaccination coverage and awareness programs, to reduce the disease burden

Table 2

INCIDENCE OF VARICELLA (CHICKENPOX) AMONG THE POPULATION IN AZERBAIJAN (NUMBER OF REPORTED CASES)

2011	*2012*	*2013*	*2014*	*2015*
10.448	8.745	9.900	13.919	11.645
Number of registered varicella (chickenpox) cases per 100,000 population				
115,4	95,3	106,5	147,8	122,2

Incidence of Varicella (Chickenpox) in Azerbaijan from 2016 to 2020. During the period from 2016 to 2020, the incidence of varicella remained relatively high, with cases peaking in 2017 and 2018 at 15,834 and 15,870 cases respectively. This corresponded to incidence rates of 162.7 and 161.6 cases per 100,000 population. In 2019, a slight decrease was observed with 14,514 cases (146.1 per 100,000). Notably, 2020 saw a significant decline to 5,305 cases, with an incidence rate of 53.0 per 100,000 population, possibly reflecting the impact of COVID-19 related public health measures such as social distancing and reduced mobility. The overall trend highlights the need for continued surveillance and vaccination strategies to manage varicella outbreaks and reduce disease incidence in Azerbaijan.

Table 3

INCIDENCE OF VARICELLA (CHICKENPOX) AMONG THE POPULATION IN AZERBAIJAN (NUMBER OF REPORTED CASES)

2016	2017	2018	2019	2020
14.809	15.834	15.870	14.514	5.305
Number of registered varicella (chickenpox) cases per 100,000 population				
153,7	162,7	161,6	146,1	53,0

Incidence of Varicella (Chickenpox) in Azerbaijan from 2020 to 2024. From 2020 to 2024, the incidence of varicella exhibited notable fluctuations. In 2021, cases increased sharply to 28,435,

Т. 12. №9 2026
https://doi.org/10.33619/2414-2948/130

corresponding to an incidence rate of 281.7 per 100,000 population. This upward trend continued in 2022, reaching a peak of 41,874 cases, with an incidence rate of 412.4 per 100,000. In 2023, the number of reported cases declined to 22,615 (221.7 per 100,000), indicating some reduction but still substantially higher than the early 2020s. These variations might be influenced by changes in public health policies, vaccination coverage, and social behavior following the COVID-19 pandemic. The data suggest a resurgence of varicella cases post-2020, highlighting the importance of strengthened vaccination programs and continuous epidemiological monitoring to control the disease in Azerbaijan.

Table 4

INCIDENCE OF VARICELLA (CHICKENPOX) AMONG THE POPULATION IN AZERBAIJAN (NUMBER OF REPORTED CASES)

2021	*2022*	*2023*	*2024*
3.285	28.435	41.874	22.615
Number of registered varicella (chickenpox) cases per 100,000 population			
32,7	281,7	412,4	221,7

Discussion

The analysis of varicella incidence in Azerbaijan from 2000 to 2024 demonstrates significant fluctuations, with a general upward trend, particularly in the last decade. The most notable peak occurred in 2023, when the incidence rate reached 412.4 cases per 100,000 population. This sharp increase may be attributed to improved disease surveillance, population growth, and possible delays in immunization during the COVID-19 pandemic, which disrupted many routine vaccination programs worldwide [8].

Between 2000 and 2010, the incidence ranged from 26.0 to 86.3 per 100,000 population, suggesting a relatively moderate disease burden. However, from 2011 to 2019, rates steadily increased, peaking at 162.7 in 2017. This pattern is consistent with global observations that varicella continues to pose a public health challenge in countries where universal varicella vaccination is not implemented [9, 10].

The dramatic drop in 2020 (53.0 per 100,000) followed by a sharp rise in subsequent years, especially in 2022 and 2023, may be linked to the pandemic's impact on healthcare access and reporting systems. Similar trends have been documented in other countries during and after COVID-19 lockdown periods [11].

The absence of a national varicella immunization program in Azerbaijan likely contributes to the recurring outbreaks and rising incidence. Countries that have introduced universal varicella vaccination have observed significant reductions in both morbidity and hospitalization rates [8, 12].

These findings highlight the need for enhanced surveillance, potential inclusion of varicella vaccination in national immunization schedules, and continuous public health education to reduce disease burden and complications associated with varicella infections.

The resurgence underscores the need to evaluate and strengthen the national varicella vaccination program and public health strategies. Increased vaccination coverage, especially among children, can significantly reduce disease incidence and prevent outbreaks. Furthermore, continuous epidemiological surveillance is essential to monitor trends and adapt interventions accordingly.

In conclusion, the fluctuating incidence of varicella in Azerbaijan over the past two decades, with a recent sharp increase, highlights the ongoing public health challenge posed by this infection. Targeted preventive measures, improved vaccination uptake, and sustained monitoring are critical to controlling varicella and mitigating its impact on population health.

Т. 12. №9 2026
https://doi.org/10.33619/2414-2948/130

Conclusion

The analysis of varicella (chickenpox) incidence in Azerbaijan from 2000 to 2024 demonstrates a dynamic epidemiological pattern, characterized by cyclical fluctuations, significant peaks, and a pronounced decline during the COVID-19 pandemic. The highest incidence was recorded in 2023, reaching over 412 cases per 100,000 population, while the lowest occurred in 2021 with just 32.7 cases per 100,000. These variations reflect not only the natural epidemiology of varicella-zoster virus (VZV) but also external influences such as public health policy, social behavior, and the indirect effects of pandemic-related restrictions. During the pandemic years, a sharp drop in registered cases was observed, likely due to decreased transmission opportunities related to school closures, social distancing, and reduced healthcare utilization. However, the post-pandemic years (2022–2023) showed an alarming resurgence, suggesting a growing population of susceptible individuals—a phenomenon often referred to as "immunity debt" [13]. This resurgence underlines the need for robust surveillance systems capable of detecting and responding to such shifts in disease trends. International experience has shown that countries implementing routine varicella vaccination—particularly within childhood immunization schedules—have achieved dramatic reductions in both morbidity and healthcare burden [14]. The absence of a universal vaccination policy in Azerbaijan leaves large segments of the population vulnerable, particularly children and young adults. Furthermore, varicella can lead to complications such as bacterial superinfections, pneumonia, and in rare cases, encephalitis, especially among immunocompromised individuals or unvaccinated adults [15]. Therefore, integrating varicella vaccination into Azerbaijan's national immunization program could significantly reduce disease incidence and prevent future outbreaks. Additionally, improving public health education, strengthening data reporting systems, and conducting periodic seroprevalence studies are critical components for evidence-based policy-making.

Acknowledgments: The authors sincerely thank the State Statistical Committee of the Republic of Azerbaijan for providing the epidemiological data utilized in this study.

References:

1. Gershon, A. A. (2008). Varicella-zoster virus infections. *Pediatrics in Review*, *29*(1), 5-11. https://doi.org/10.1542/pir.29-1-5

2. Heininger, U., & Seward, J. F. (2006). Varicella. *The Lancet*, *368*(9544), 1365-1376. https://doi.org/10.1016/S0140-6736(06)69561-5

3. Arvin, A. M. (1996). Varicella-zoster virus. *Clinical microbiology reviews*, *9*(3), 361-381. https://doi.org/10.1128/cmr.9.3.361

4. Bonanni, P., Breuer, J., Gershon, A., Gershon, M., Hryniewicz, W., Papaevangelou, V., ... & Wutzler, P. (2009). Varicella vaccination in Europe–taking the practical approach. *BMC medicine*, *7*(1), 26. https://doi.org/10.1186/1741-7015-7-26

5. Williams, W. W., Lu, P. J., O'Halloran, A., Bridges, C. B., Kim, D. K., Pilishvili, T., ... & Markowitz, L. E. (2015). Centers for Disease Control and Prevention (CDC) Vaccination coverage among adults, excluding influenza vaccination—United States, 2013. *MMWR Morb Mortal Wkly Rep*, *64*(4), 95-102.

6. World Health Organization (2019). Varicella and herpes zoster surveillance. WHO.

7. Kim, H. J., Fay, M. P., Feuer, E. J., & Midthune, D. N. (2000). Permutation tests for joinpoint regression with applications to cancer rates. *Statistics in medicine*, *19*(3), 335-351. https://doi.org/10.1002/(SICI)1097-0258(20000215)19:3<335::AID-SIM336>3.0.CO;2-Z

8. Martin, J. M., & Green, M. (2006, July). Group A streptococcus. In *Seminars in pediatric infectious diseases* (Vol. 17, No. 3, pp. 140-148). WB Saunders. https://doi.org/10.1053/j.spid.2006.07.001

9. Lopez, A. S., Zhang, J., Brown, C., & Bialek, S. (2011). Varicella-related hospitalizations in the United States, 2000–2006: the 1-dose varicella vaccination era. *Pediatrics*, *127*(2), 238-245. https://doi.org/10.1542/peds.2010-0962

10. World Health Organization. (2014). Varicella and herpes zoster vaccines: WHO position paper, June 2014= Vaccins contre la varicelle et le zona: note de synthèse de l'OMS, juin 2014. *Weekly Epidemiological Record= Relevé épidémiologique hebdomadaire*, *89*(25), 265-287.

11. Bramer, C. A., Kimmins, L. M., Swanson, R., Kuo, J., Vranesich, P., Jacques-Carroll, L. A., & Shen, A. K. (2020). Decline in child vaccination coverage during the COVID-19 pandemic—Michigan Care Improvement Registry, May 2016–May 2020. *MMWR. Morbidity and mortality weekly report*, *69*. http://dx.doi.org/10.15585/mmwr.mm6920e1

12. Wutzler, P., Bonanni, P., Burgess, M., Gershon, A., Sáfadi, M. A., & Casabona, G. (2017). Varicella vaccination-the global experience. *Expert review of vaccines*, *16*(8), 833-843. https://doi.org/10.1080/14760584.2017.1343669

13. Ruhl, L. (2022). Disentangling The Vaccination Narrative: Vaccination stories and health policy in BC.

14. Leung, J., Bialek, S. R., & Marin, M. (2015). Trends in varicella mortality in the United States: data from vital statistics and the national surveillance system. *Human vaccines & immunotherapeutics*, *11*(3), 662-668. https://doi.org/10.1080/21645515.2015.1008880

15. Heininger, U., & Seward, J. F. (2006). Varicella. *The Lancet*, *368*(9544), 1365-1376. https://doi.org/10.1016/S0140-6736(06)69561-5

Список литературы:

1. Gershon A. A. Varicella-zoster virus infections // Pediatrics in Review. 2008. V. 29. №1. P. 5-11. https://doi.org/10.1542/pir.29-1-5

2. Heininger U., Seward J. F. Varicella // The Lancet. 2006. V. 368. №9544. P. 1365-1376. https://doi.org/10.1016/S0140-6736(06)69561-5

3. Arvin A. M. Varicella-zoster virus // Clinical microbiology reviews. 1996. V. 9. №3. P. 361-381. https://doi.org/10.1128/cmr.9.3.361

4. Bonanni P., Breuer J., Gershon A., Gershon M., Hryniewicz W., Papaevangelou V., Wutzler P. Varicella vaccination in Europe–taking the practical approach // BMC medicine. 2009. V. 7. №1. P. 26. https://doi.org/10.1186/1741-7015-7-26

5. Williams W. W., Lu P. J., O'Halloran A., Bridges C. B., Kim D. K., Pilishvili T., Markowitz L. E. Centers for Disease Control and Prevention (CDC) Vaccination coverage among adults, excluding influenza vaccination—United States, 2013 // MMWR Morb Mortal Wkly Rep. 2015. V. 64. №4. P. 95-102.

6. World Health Organization. Varicella and herpes zoster surveillance. WHO; 2019.

7. Kim H. J., Fay M. P., Feuer E. J., Midthune D. N. Permutation tests for joinpoint regression with applications to cancer rates // Statistics in medicine. 2000. V. 19. №3. P. 335-351. https://doi.org/10.1002/(SICI)1097-0258(20000215)19:3<335::AID-SIM336>3.0.CO;2-Z

8. Martin J. M., Green M. Group A streptococcus // Seminars in pediatric infectious diseases 2006. V. 17. №3. P. 140-148. https://doi.org/10.1053/j.spid.2006.07.001

9. Lopez A. S., Zhang J., Brown C., Bialek S. Varicella-related hospitalizations in the United States, 2000–2006: the 1-dose varicella vaccination era // Pediatrics. 2011. V. 127. №2. P. 238-245. https://doi.org/10.1542/peds.2010-0962

10. World Health Organization et al. Varicella and herpes zoster vaccines: WHO position paper, June 2014= Vaccins contre la varicelle et le zona: note de synthèse de l'OMS, juin 2014 // Weekly Epidemiological Record= Relevé épidémiologique hebdomadaire. 2014. V. 89. №25. P. 265-287.

11. Bramer C. A., Kimmins L. M., Swanson R., Kuo J., Vranesich P., Jacques-Carroll L. A., Shen A. K. Decline in child vaccination coverage during the COVID-19 pandemic—Michigan Care Improvement Registry, May 2016–May 2020. MMWR // Morbidity and mortality weekly report. 2020. P. 69. http://dx.doi.org/10.15585/mmwr.mm6920e1

12. Wutzler P., Bonanni P., Burgess M., Gershon A., Sáfadi M. A., Casabona G. Varicella vaccination-the global experience // Expert review of vaccines. 2017. V. 16. №8. P. 833-843. https://doi.org/10.1080/14760584.2017.1343669

13. Ruhl L. Disentangling The Vaccination Narrative: Vaccination stories and health policy in BC. 2022.

14. Leung J., Bialek S. R., Marin M. Trends in varicella mortality in the United States: data from vital statistics and the national surveillance system // Human vaccines & immunotherapeutics. 2015. V. 11. №3. P. 662-668. https://doi.org/10.1080/21645515.2015.1008880

15. Heininger U., Seward J. F. Varicella // The Lancet. 2006. V. 368. №9544. P. 1365-1376. https://doi.org/10.1016/S0140-6736(06)69561-5

Поступила в редакцию
07.06.2026 г.

Принята к публикации
16.06.2026 г.

Ссылка для цитирования:

Valizada S., Valizada Kh. Epidemiological Trends of Varicella (Chickenpox) in Azerbaijan: Analysis of Registered Cases from 2000 to 2024 // Бюллетень науки и практики. 2026. Т. 12. №9. С. 313-319. https://doi.org/10.33619/2414-2948/130/35

Cite as (APA):

Valizada, S., & Valizada, Kh. (2026). Epidemiological Trends of Varicella (Chickenpox) in Azerbaijan: Analysis of Registered Cases from 2000 to 2024. *Bulletin of Science and Practice, 12*(9), 313-319. https://doi.org/10.33619/2414-2948/130/35