# The Impact of the COVID-19 Pandemic on Epidemiological Surveillance and AFP Reporting

*Samira* Jayche[1*], *Hajar* El Omari[2,3], *Sanae* Sendaoui[4], *Amr* Loutfi[5], *Rachid* Amgoun[5], *Jamal* Assiss[5], *Abdeslam Dahane*[5], *Redouane* Abdelmoumen[5], *Mohamed* Lahmam[1], *Ahmed O.T.* Ahami[6], *Elmahjoub* Aouane [7], *Ahmed* Idrissi[8], *Fatima Z.* Talbi[9]

[1] ISPITS- Higher Institute of Nursing and Health Techniques Professions, Rabat. Kenitra Annex. sjayche@yahoo.f.
[2] Natural Resources Management and Development Team, Laboratory of Health and Environment, Faculty of Sciences, Moulay Ismail University, Meknes, Morocco.
[3] Higher Institute of Nursing Professions and Health Techniques of Fez, Annex Meknes, Morocco
[4] Ministry of Health in Agadir, Morocco
[5]Ministry of Health in Kenitra, Morocco
[6] Biology and Health Laboratory, Department of Biology, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco
[7]Department of Biology Laboratory Natural Resources and Sustainable Development Faculty of Science Ibn Tofail University,Kenitra, Morocco
[8]National School of Public Health, Rabat, Morocco.
[9]Sidi Mohamed Ben Abdellah University, Faculty of Sciences Dhar El Mahraz, Laboratory of Biotechnology, Conservation and Valorization of Naturals Resources (LBCVNR), 30000 Fez, Morocco.

**Abstract:** The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has profoundly affected global health systems, challenging disease surveillance and routine immunization programs. This study assesses the impact of the pandemic on epidemiological surveillance and Acute Flaccid Paralysis (AFP) reporting in Kénitra Province, Morocco. Using retrospective data from 2019 to 2023, we compared AFP case notifications before, during, and after the critical phases of the pandemic. Findings reveal a significant decline in AFP reporting during 2020–2021, coinciding with lockdowns and resource reallocation to COVID-19 response, followed by recovery in 2022. Routine immunization coverage also decreased, heightening risks of vaccine-preventable disease resurgence. These results underscore the necessity of maintaining surveillance and immunization programs even amid health crises, and the importance of resilient health systems to ensure continuity of essential services.

**Keywords**: COVID-19; Epidemiological Surveillance; Acute Flaccid Paralysis (AFP); Routine Immunization; Kénitra Province, Morocco.

## 1. Introduction

The emergence of SARS-CoV-2 in late 2019 led to an unprecedented global health crisis. Declared a Public Health Emergency of International Concern by the World Health Organization (WHO) in January 2020, COVID-19 rapidly spread worldwide, disrupting health systems, economies, and societies. Morocco implemented early containment measures, including lockdowns, mandatory masking, and extensive contact tracing. However, these interventions, while vital for reducing transmission, affected routine public health programs, notably disease surveillance and immunization efforts. [1]

## 2. Methods

*Study design*

A retrospective descriptive analysis was conducted using data from the epidemiological surveillance unit (UVSSE) of Kénitra Province, covering the period from 2019 to 2023.

*Data collection*

Children under 15 years old with AFP symptoms in Kenitra province were included in the data collection. Data on AFP case reporting was collected before, during, and after the COVID-19 pandemic phases. All PFA cases that were

reported outside of the research period were not included in the analysis.

*Ethics approval and consent to participate*

This retrospective study used data from PFA case survey forms as part of mandated disease reporting, therefore patients did not need to give informed permission. The National Committee for the Protection of Personal Data was asked for authorization (CNPDP).

*Data analysis*

A comparative analysis of AFP case notification trends was performed to assess variations across the study period. The chi-square test was applied to evaluate differences in AFP reporting between years, with statistical significance set at $p<0.05$. The spatial distribution of reported cases was analyzed using QGIS version 3.28.2 to visualize geographic patterns and temporal changes.

## 3. Results

The first positive case in the province of Kenitra was reported on March 15, 2020. There have been 43,755 positive cases of SARS-CoV-2 since then, spread out over multiple waves depending on the variation prevalent at the time.

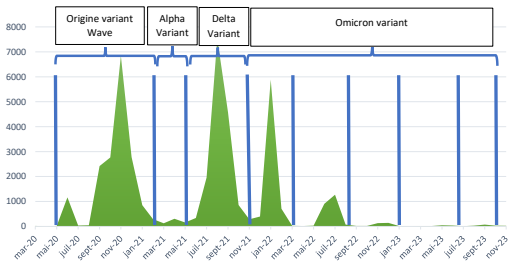


**Fig 1:** Monthly epidemic curve of COVID-19 in the province of Kenitra (2020-2023)

The provincial epidemic curve for positive COVID-19 cases [figure 1] is quite like the national curve, with the various variations showing up in waves and smaller waves.

On Thursday, January 28, 2021, the Covid-19 vaccine campaign officially began. Since then, the Kenitra province's personnel department has effectively vaccinated 809,149 persons with 1,878,815 doses of vaccine, which is 89% of the needed four doses, and 83% of doses 1 and 2 [figure 2].

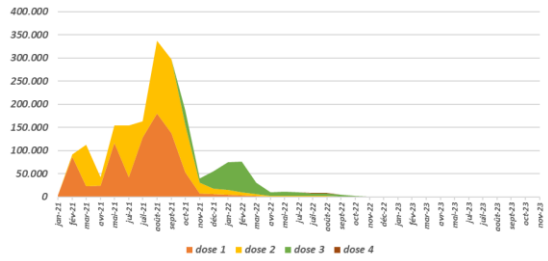


**Fig 2:** COVID-19 vaccination in the province of Kenitra (2020-2023)

During the pandemic, health workers in Kénitra Province faced heavy workloads as resources were redirected toward COVID-19 response and vaccination campaigns. This shift contributed to a decline in AFP case reporting in 2020 and 2021. Only two AFP cases were reported in 2020, compared to six in 2019 and nine in 2022, when reporting recovered to WHO recommended levels (2 per 100,000) ($p = 0.032<0.05$). [Figure 3]

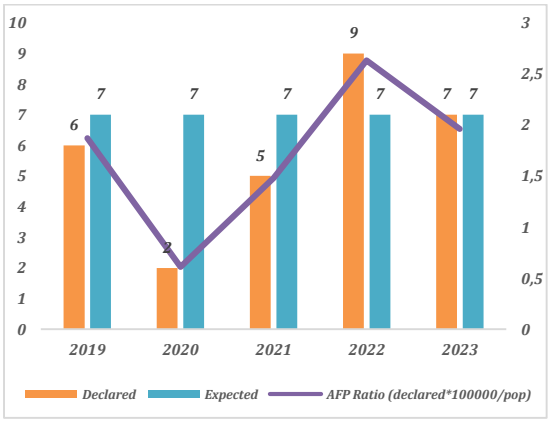


**Fig 3:** Distribution of AFP cases expected and reported in Kenitra province during the period 2019-2023

Between 2019 and 2023, 27 AFP cases were recorded, mainly concentrated in urban communes such as Kénitra commune and Sidi Taibi. [Figure 4] Routine polio vaccination coverage also dropped below the 90% threshold required for herd immunity during the pandemic, exposing potential risks of resurgence ($p=0.027<0.05$). [Figure 5]

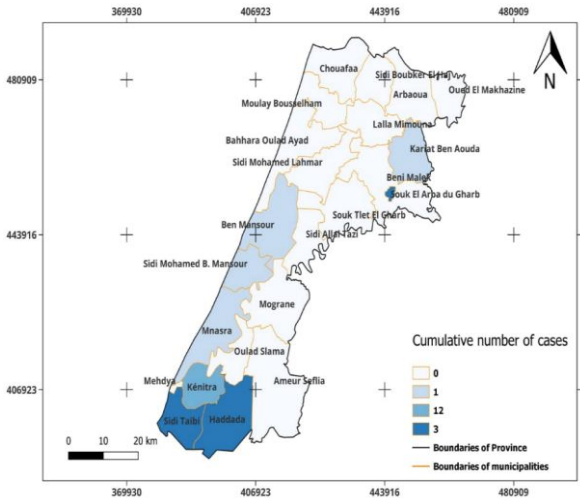


**Fig 4:** Cumulative AFP cases in Kenitra province (2019-2023)

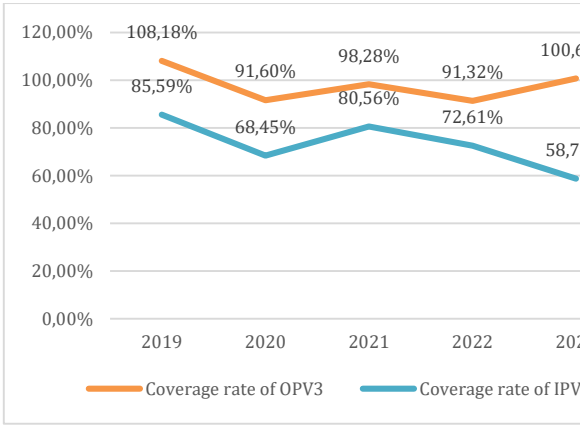


**Fig 5:** Polio vaccination coverage in Kenitra province (2019-2023)

## 4. Discussion

The December 2019 discovery of SARS-CoV-2 caused a global epidemic of historic proportions. To combat the epidemic, the healthcare system had to prioritize. The rearrangement of priorities has had numerous effects. Before, during, and after the COVID-19 epidemic, polio epidemiological surveillance was affected.[2] [3].

Kenitra reported its first COVID-19 case in mid-March 2020. Since February 2020, the healthcare system tracked possible coronavirus cases. Healthcare providers prioritized urgent treatment above non-urgent care during COVID-19. [4]

Since the COVID-19 pandemic began, AFP cases in 2020 and 2021 were lower than projected by the WHO. The Kenitra province's non-polio AFP ratio was 0.61/100,000 in 2020, a fifth of 2019's 1.87/100,000, significantly below our country's aim of 2/100,000. This suggests pandemic disruption of AFP monitoring. Only after 2022 did reporting improve and meet the desired level for Kenitra. Iran, South Africa, Africa, Pakistan, and Afghanistan showed similar outcomes. [5] [6] [7] [8]. There was no change in reporting time, sample routing investigation, or sample adequacy before and during the 2020 pandemic. [9].

It is important to note that the cases recorded in 2020 were reported in February, before the implementation of lockdown measures in Morocco.

Municipalities and residential contexts reported COVID-19 differently. The majority of notified PFAs are urban and centered in Kénitra. The populace fears visiting to health facilities for immunizations and routine medical checks, especially for their small children. The fear of catching the virus in medical settings and stringent social distance have contributed to this reluctance. Parents worried that visiting health centers and hospitals might raise their children's and their own coronavirus risk.

Several studies have revealed that pandemic healthcare access has decreased significantly. [10] [11]

Routine immunization campaigns have been delayed or interrupted because of the COVID-19 epidemic. This condition harms public health by lowering vaccination rates and increasing disease transmission risks. Our investigation found polio vaccination rates falling between 2020 and 2021. Many nations reduced vaccination coverage during the epidemic. [12] [13].

The decrease in immunization has had serious consequences for public health, increasing the risk of vaccine-preventable illnesses emerging

and weakening efforts against measles and polio. [14] [15].

## 5. Conclusion

The COVID-19 pandemic had a considerable impact on AFP surveillance and immunization efforts in Morocco. The decline in case reporting and vaccination coverage highlights the vulnerability of health systems under crisis pressure. Strengthening integrated surveillance, ensuring continuity of essential services, and leveraging digital tools are key lessons for future pandemic preparedness.

## References

1. World Health Organization 2023 Coronavirus Disease (COVID-19) August 9, 2023 https://www.who.int/news-room/fact-sheets/detail/coronavirus-disease-%28covid-19%29
2. Jayche S, Idrissi A, Talbi FZ, Baghouz A, Sendaoui S, Loutfi A, et al. Evaluation of WHO indicators for surveillance of acute flaccid paralysis in children: The case of Kenitra province, Morocco; from 1994 to 2018. Bangladesh J Med Sci [Internet]. 2024 Oct. 2 [cited 2025 Oct. 18];23(4):1185-96. Available from: https://banglajol.info/index.php/BJMS/article/view/76536
3. Jayche, Samira, et al. "Monitoring system for Acute Flaccid Paralysis in Children: the case of Kénitra Province, Morocco; between 1994 and 2018" 1ST INTERNATIONAL CONFERENCE ON CHEMICAL AND BIOLOGICAL SCIENCES (ICCBS'22), Moroccan Association For Applied Sciences and Innovation, 2022, pp. 157-164. https://doi.org/10.2478/9788367405256https://doi.org/10.2478/9788367405256-022
4. Jbari, S., Lahmini, W., Boussaa, S., & Bourrous, M. (2022). Impact of Covid-19 pandemic on pediatric meningitis incidence in central Morocco. Scientific African, 16, e01213. https://doi.org/10.1016/j.sciaf.2022.e01213
5. Rana, M. S., Asghar, R. J., Usman, M., Ikram, A., Salman, M., Umair, M., ... & Ullah, N. a 2022. The resurgence of wild poliovirus in Pakistan and Afghanistan: A new setback for polio eradication. The Journal of Infection, 85(3), 334
6. Arad, B. ., Farshad moghaddam, H. ., Jamshidi, M. ., & Pirzadeh, Z. (2024). Impact of the COVID-19 Outbreak on Aseptic Meningitis in Children. Iranian Journal of Child Neurology, 18(3), 83–89. https://doi.org/10.22037/ijcn.v18i3.40219.
7. Manyanga, D., Masvikeni, B., Kuloba, M., Byabamazima, C., & Daniel, F. 2021. Early effects of the COVID-19 pandemic on the acute flaccid paralysis surveillance in East and Southern African countries. Pan African Medical Journal, 39(1)
8. Bigouette, J. P., Callaghan, A. W., Donadel, M., Porter, A. M., Rosencrans, L., Lickness, J. S., ... & Murrill, C. S. 2022. Effects of COVID-19 on vaccine-preventable disease surveillance systems in the World Health Organization African Region, 2020.
9. Cintyamena, U., Bura, V., Surya, A., Wibisono, H., Ahmad, R. A., & Mahendradhata, Y. 2022. Maintaining Polio-free status in Indonesia during the COVID-19 pandemic. Global Health: Science and Practice, 10(1)
10. Ullrich, A., Schranz, M., Rexroth, U., Hamouda, O., Schaade, L., Diercke, M., & Boender, T. S. 2021. Impact of the COVID-19 pandemic and associated non-pharmaceutical interventions on other notifiable infectious diseases in

Germany: An analysis of national surveillance data during week 1–2016–week 32–2020. The Lancet Regional Health–Europe, 6

11. Pujolar, G., Oliver-Anglès, A., Vargas, I., & Vázquez, M. L. 2022. Changes in access to health services during the COVID-19 pandemic: a scoping review. International journal of environmental research and public health, 19(3), 1749.
12. Basu, S., Ashok, G., Debroy, R., Ramaiah, S., Livingstone, P., & Anbarasu, A. 2023. Impact de la pandémie de COVID-19 sur le paysage vaccinal de routine : une perspective mondiale. Human Vaccines & Immunotherapeutics, 19 (1).
13. Ali, I. 2020. Impact of COVID-19 on vaccination programs: adverse or positive?. Human vaccines & immunotherapeutics, 16(11), 2594-2600.
14. Borre, F., Borri, J. I., Cohen, Y. Z., Gasparoto, M., & Gurung, T. B. 2022. Impact of the COVID-19 pandemic on infectious diseases in Brazil: a case study on dengue infections. Epidemiologia, 3(1), 97-115
15. Hirae, K., Hoshina, T., & Koga, H. 2023. Impact of the COVID-19 pandemic on the epidemiology of other communicable diseases in Japan. International Journal of Infectious Diseases, 128, 265-271