

A resurgence and re-emergence of diphtheria in Nigeria, 2023

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Diphtheria is a highly contagious vaccine-preventable bacterial infection caused by *Corynebacterium diphtheriae* that primarily infects the throat (pharynx and tonsils) and nose.¹ The bacterium has an estimated basic reproduction number of 1.7–4.3.² Although diphtheria is treatable if detected early, it can lead to severe complications such as respiratory failure, heart problems and even deaths (case-fatality ratio among untreated, never vaccinated cases 28.8–29.2%).² It remains a health problem in low-resource countries, particularly where vaccination uptake and coverage are low and where sanitation conditions remain poor.³

On December 1, 2022, the Nigeria Centre for Disease Control (NCDC) was notified of suspected diphtheria outbreaks in two of the largest states in Nigeria, Lagos, and Kano, with a combined population of over 30 million. On January 20, 2023, the Director General of the NCDC issued an advisory confirming the outbreaks in Lagos and Kano and the development in two other states, Yobe and Osun, is being monitored.¹ As of February 3, 2023, 216 confirmed cases and 40 persons have died (case fatality rate of 18.5%) from the infection in the current outbreak in Nigeria⁴ (Figure 1). This ongoing outbreak mainly occurred in children aged 2 to 14 (85.2%) and in Kano state (97.7%). It is worth mentioning that only a fraction, 27 (12.5%) of the confirmed cases, were fully vaccinated with diphtheria-tetanus-pertussis (DTP3)—a three-dose vaccine.⁴ The Nigerian outbreak has underscored the importance of vaccination and herd immunity and has rekindled the discussion around low vaccination uptake due to COVID-19 in many low-resource countries and consequent opportunistic outbreaks.

Diphtheria vaccination is one of the pentavalent vaccines on the Nigerian childhood immunisation schedule. However, vaccination coverage estimates have been on the decline globally.^{5,6} DTP3 vaccination rate dropped from 86% in 2019 to 81% in 2021.⁷ Despite the efforts to reach the diphtheria herd immunity threshold (75–80%),⁸ the overall vaccination coverage of 56%⁷ in Nigeria remains suboptimal, with significant variations in DTP3 immunisation coverage across Nigerian states (<20% to 80%; Figure 2).

Essential vaccination coverage and uptake among Nigeria under-fives are very low.⁹ Evidence suggests that maternal education, common misconceptions or beliefs, household decision-making dynamics (influence of male partner and family), misinformation and mistrust in vaccines, adverse events following immunisation, unavailability of vaccines, proximity to health facilities and shortage of healthcare workers are associated with low vaccine uptake and differences across states.^{9–11} Furthermore, COVID-19 pandemic impacted vaccine uptake by creating barriers to accessing vaccination services and decreasing immunisation demand and uptake among caregivers. Movement restrictions and lockdowns also resulted in decreased general healthcare service delivery, increased transportation costs, fewer engagements to promote vaccine uptake, and the discontinuation of mobile vaccination campaigns that targeted hard-to-reach communities.⁷

Thus, the decline in the vaccination rate has put vulnerable people, such as children and unvaccinated individuals living in poor sanitary conditions at a greater risk. Close contact with infected individuals facilitates the spread of the disease,¹² and given that the present outbreak is in highly

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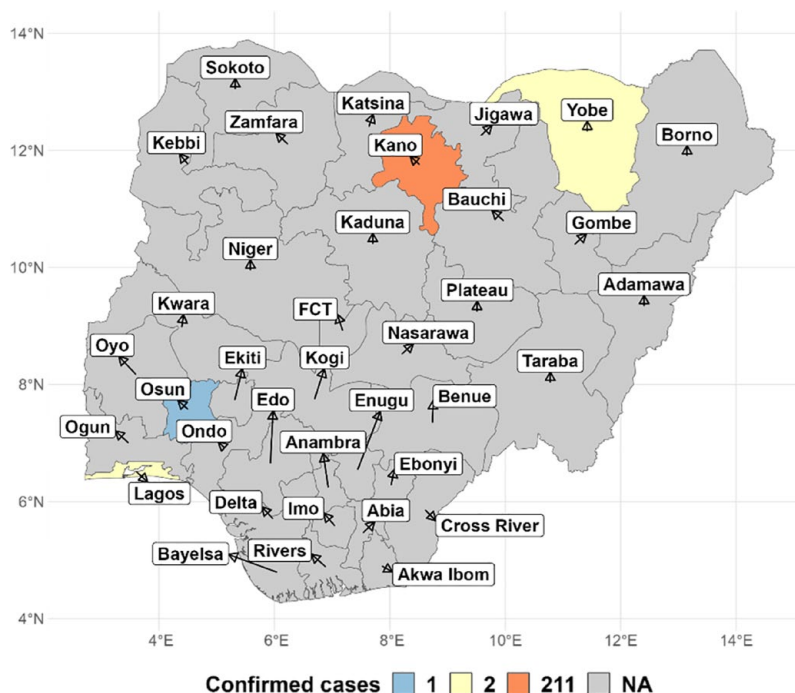


Figure 1. Map of Nigeria showing the location of the Diphtheria outbreak.

densely populated areas, travellers must be aware of the risk and take appropriate precautions to protect themselves and others. This diphtheria outbreak also highlights the need for ongoing collaborative surveillance and rapid response in the event of an outbreak. The World Health Organization (WHO) also noted the components in the recent technical report with proposals to strengthen global emergency preparedness, response, and resilience.¹³ Moreover, the outbreak serves as a reminder of the importance of herd immunity and the impact of vaccination coverage on controlling the spread of infectious diseases.

The NCDC has given advice and provided some useful strategies for the prevention and mitigation of diphtheria for the populace and healthcare workers. Some of these strategies focus on meeting the full vaccination schedule, and others on diagnosis, treatment, surveillance, contact tracing, monitoring, and appropriate reporting of diphtheria cases.

Drawing from the NCDC, we recommend that:

- Nigerians adhere to the childhood immunisation schedule and ensure that their children are fully vaccinated. Catch-up immunisation may be needed in accordance with the immunisation schedule.
- Carers for diphtheria-infected persons should practise strict hygiene, particularly when handling food and cooking. Booster vaccination may also be considered for close contacts and carers.
- Public health officials and healthcare workers should promote awareness of the disease, vaccination effectiveness and safety, and treatment and prevention activities against diphtheria. States with low vaccination coverage and which experience disease outbreaks shall be of intervention focus.
- All health workers should maintain precautionary behaviour, have a high index of suspicion for diphtheria, isolate confirmed cases, and trace close contacts for prompt treatment. Finally, all healthcare workers should be up to date with their vaccinations. It will minimise the risk of infections, including that from exposure to diphtheria.

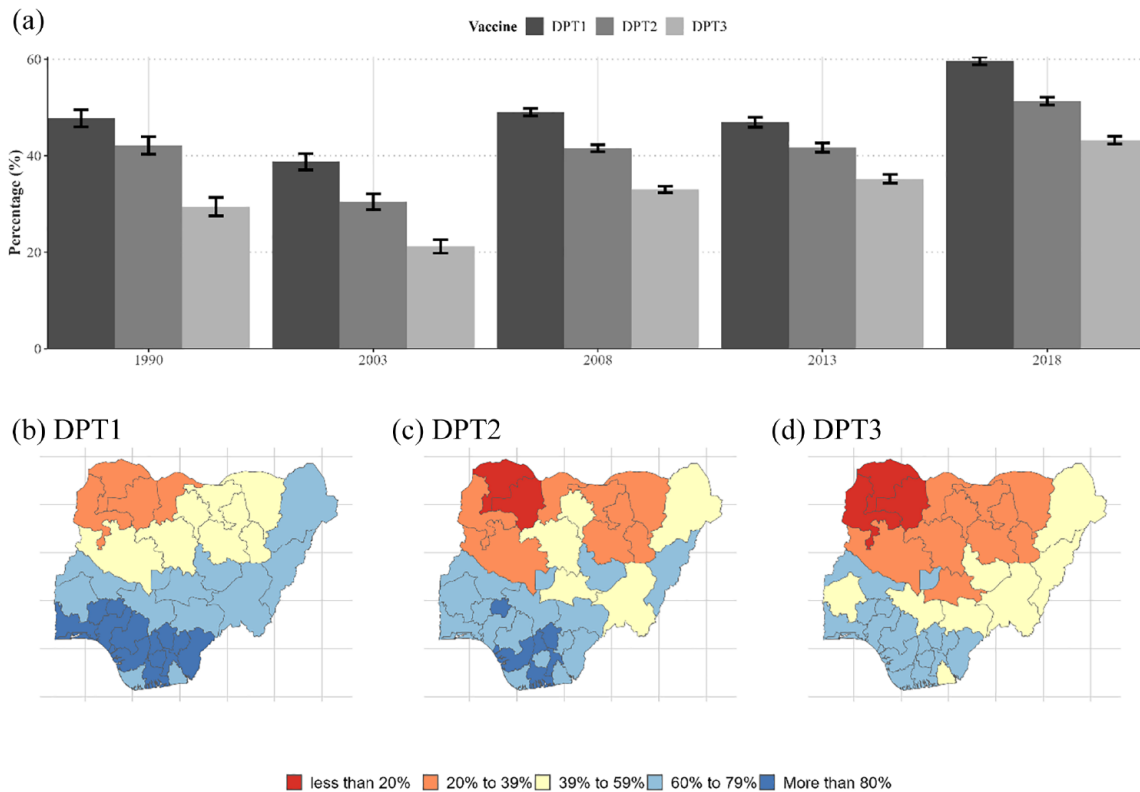


Figure 2. Percentage DTP doses immunisation coverage among under-5 children in Nigeria. (a) Temporal coverage based on the Nigerian demographic health surveys (NDHS) from 1990 to 2018. (b) Immunisation coverage variations across the 36 states and the federal capital territory based on the 2018 NDHS. The coverage was computed by adjusting for the sample design (weights, clusters, and stratum).

In conclusion, the diphtheria outbreak serves as a reminder of the ongoing threat of infectious diseases and the importance of vaccination and herd immunity in preventing their spread. We urge public health officials and healthcare providers to take immediate action to control the spread of the disease. In addition, provide necessary care to those affected, and seize the opportunity to educate the public about the safety and efficacy of vaccines as well as the practice of good hygiene, such as frequent hand washing and avoiding close contact with sick individuals.

Declarations

Ethics approval and consent to participate

Not applicable. All data sets used in the analyses are publicly available.

Consent for publication

Not applicable.

Author contributions

Oyelola A. Adegboye: Conceptualisation; Data curation; Formal analysis; Investigation; Methodology; Visualisation; Writing – original draft; Writing – review & editing.

Faith O. Alele: Investigation; Resources; Writing – original draft; Writing – review & editing.

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