

Diphtheria Outbreak in Somalia: An Alarming Public Health Crisis, Challenges, and Solutions

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Abstract: Diphtheria, known in Somalia as Gawracato, has re-emerged in 2023, highlighting growing vulnerabilities in the country's health system. The first case reported in the Mahaday District of Hirshabelle state. Then, immediately, the outbreak spread south to Banadir and north to Puntland, resulting in widespread transmission. In August 2025, Somalia had reported 1811 suspected cases and 89 deaths, with a case fatality rate (CFR) of 5%. More than 80% of cases occurred in children under fifteen years of age, and the majority of patients had no history of diphtheria vaccination. Although immunization campaigns such as the Big Catch-Up improved national coverage, PENTA 3 coverage remained below the herd immunity threshold required to halt transmission. However, contributing factors include limited laboratory confirmation capacity, under-reporting in IDP camps, inadequate surveillance system, and delayed case detection and response to emerging outbreaks. Therefore, the ongoing outbreak underscores the urgent need for strengthened vaccination systems, sustainable financing, laboratory expansion, and community engagement to prevent future resurgences of vaccine-preventable diseases.

Keywords: diphtheria outbreak, immunization, public health, Somalia

Introduction

Diphtheria, known in Somalia as Gawracato, is a vaccine-preventable disease that has been largely controlled in many parts of the world through routine immunization. However, it remains endemic or occurs sporadically in countries with low vaccination coverage. Alarming, Somalia experienced a significant re-emergence of diphtheria in 2023, highlighting persistent gaps in immunization and disease surveillance. The first reported case was detected in July 2023 among displaced people in Mahaday District of Hirshabelle State. Initial laboratory confirmation required sending samples abroad, where five of six early samples tested positive for *Corynebacterium diphtheriae* by real-time PCR at the UK Health Security Agency laboratory, confirming an outbreak.^{1,2} From this first case, the infection quietly spread south to Banadir and into central and north-eastern regions, establishing footholds in Galmudug and Puntland by late 2023. In September 2023, cases were being reported as far as Garowe and Galkayo in Puntland, indicating that the outbreak was no longer localized but had become a nationwide concern.^{1,2} Therefore, diphtheria outbreak had long been considered a vaccine-preventable disease, largely eliminated in industrialized countries due to extensive vaccination coverage.³ This paper aims to describe the epidemiological characteristics, challenges, and lessons learned from the 2023–2025 diphtheria outbreak in Somalia Figure 1.¹

In 2024, Somalia faced sustained transmission of diphtheria outbreak and sporadic cases turned into sizable clusters in multiple regions, with health facilities gradually recognizing the unfamiliar disease. In total, 838 cases and 56 deaths were recorded in 2024.¹ However, it was begun as a small outbreak in 2023 accelerated in 2024 despite response efforts, indicated that transmission was not contained. In fact, August 17, 2025 (epidemiological week 33), officials had tallied 1811 suspected cases and 89 deaths (CFR 5%), along with 22 community deaths. Seventy-nine percent of cases were in children under 15, and 87%

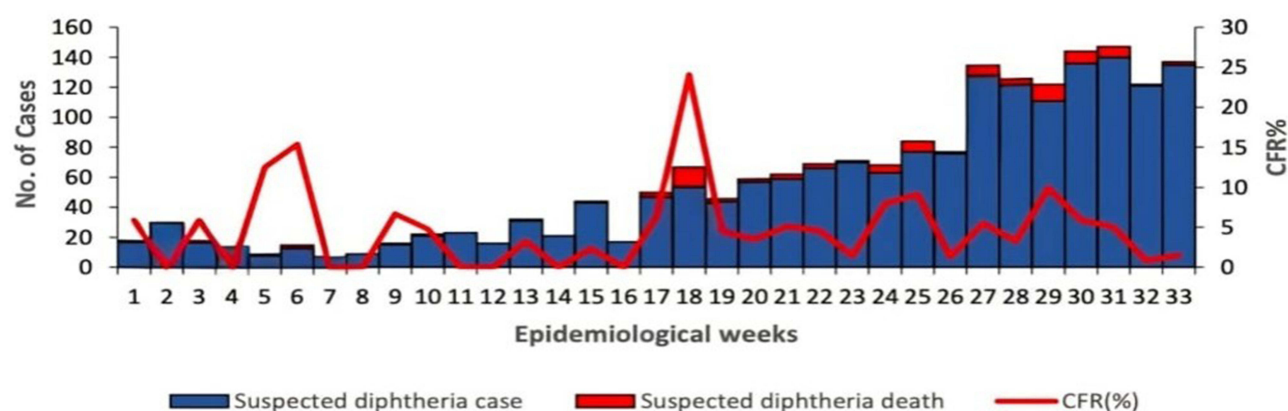


Figure 1 Epidemiological curve for Suspected Diphtheria cases since week 1–33, 2025.

had no vaccination history and compared to the same period in 2024, reported cases were four times higher. For example, during week 33 alone, 135 new suspected cases and 2 deaths were reported, marking an 11.5% increase from the previous week.¹

Geographic Spread and Community Impact

From its origin in central Somalia, the diphtheria outbreak radiated outward, stretching north to Bosaso and south to Kismayo, often following displacement and conflict-affected migration routes.^{1,2} Although, by 2025, the outbreak was firmly entrenched across multiple states. In Mogadishu, by week 33 of 2025, 720 cases and 49 deaths (CFR 6.8%) had been reported, the majority from displaced communities in Daynile, Hamarweyne, and surrounding settlements.¹ Puntland state emerged as another epicentre, with 756 cases and 29 deaths, particularly concentrated in Galkayo (384 cases, 8 deaths) and Garowe (237 cases, 7 deaths). Despite this, when compared in Galmudug state, 112 cases and 6 deaths were recorded by the same period, most in Galkayo and Hobyo. On the other hand, South West State also reported significant transmission, with 177 cases and 3 deaths, mainly clustered in Burhakaba and Baidoa IDP settlements.¹ Additionally, Hirshabelle state was registered in sporadic clusters including 23 cases and 1 death in Jowhar, while Jubaland state confirmed 2 cases in Kismayo. Meanwhile Somaliland reported isolated cases in Badhan (Sanag) and Buhodle (Togdheer). Bosaso in Bari region of Puntland state reported 11 cases and 5 deaths (CFR 45%), underscoring the dangers of delayed recognition and limited access to treatment.¹ Overall, children under 15 years accounted for nearly 80% of cases, with the vast majority lacking any record of diphtheria-containing vaccination.¹ The outbreak placed enormous strain on referral hospitals such as De Martino in Mogadishu and Garowe General Hospital, while also disrupting community life, with school attendance sharply declining during peak waves.

Vaccination Coverage

Somalia's resurgence of diphtheria is fundamentally linked low vaccination coverage. For decades, fewer than half of Somali children completed basic immunizations, and DTP3 coverage hovered around 30% to 40% as recently as 2021–2022.^{4–10} Even though relatively accessible urban districts like Banadir, coverage rarely exceeded 40%.^{11,12} In recent years, child vaccination rates in Somalia have improved. However, estimates from WHO and UNICEF indicate that by 2024, only about 70% of Somali children were fully vaccinated. This progress reflects intensified efforts, particularly through the 2023–2024 Big Catch-Up campaign, which successfully reached nearly 700,000 previously unvaccinated (zero-dose) children,^{2,3,13} Cold-chain systems also improved, with many facilities equipped with solar-powered fridges.¹³

In Garowe, the vaccination status of diphtheria cases illustrates the extent of immunity gaps. In 2023, all four reported cases were zero-dose, indicating that none of the affected children had received any vaccination. The burden escalated sharply in 2024, with 210 cases reported, of which 88% were among unvaccinated children. For 2025, 162 cases were recorded, and although there was a slight improvement, 80% of the cases were still zero-dose. This trend reveals that despite overall increases in national coverage, large numbers of children remain unprotected at the local level, which is

contributing ongoing transmission and sustaining the outbreak. In response to the public health crisis, supplementary immunization activities were introduced. Also, in August 2025, an emergency Td campaign in Puntland mobilized 81 mobile teams and vaccinated about 210,000 children aged 5–14 years.² Supplementary immunization activities campaigns provided vital protection, global vaccine shortages and donor funding cuts hindered scale-up, leaving significant gaps in coverage and allowing the outbreak to persist.

Laboratory Confirmation and Surveillance Gaps

Since diphtheria outbreak commenced in Somalia, it still lacked in-country diagnostic capacity. Initial samples were sent abroad, causing significant delays in confirmation.^{2,13} The clinical diagnoses made at Banadir Hospital were initially overlooked by humanitarian agencies, causing a critical delay of several months before the outbreak was officially recognized and life-saving interventions were launched. In mid-2024, while laboratories in Mogadishu and Garowe had gained real-time PCR capabilities, limited resources and uneven capacity across the country continued to hinder an effective and timely response. Therefore, surveillance gaps further compounded the crisis because of diphtheria was not initially prioritized in Somalia's Integrated Disease Surveillance and Response framework, resulting in many early cases being overlooked.^{2,13} Patients often first sought care at pharmacies or traditional healers, bypassing official reporting systems, and its investigations in Garowe showed that transmission had spread for weeks before being formally detected.² Although weekly reporting had improved, but insecurity, incomplete data, and the lack of routine toxigenicity testing continued to undermine accuracy.^{2,3,11–17}

The Importance of Herd Immunity

Pentavalent vaccines, which include protection against diphtheria, were introduced in Somalia in early 2013. Despite this milestone, nationwide coverage has remained insufficient to prevent outbreaks. Diphtheria has a basic reproduction number high enough that population coverage near the mid-80s is required for herd protection.^{14,18} In Somalia, DTP3 coverage has historically been persistently low, often between 30% and 40% in many years. Additionally, more recent data from DHIS2 show some improvement. In 2022, nationwide PENTA 1 coverage reached 84.3%, but PENTA 2 and 3 lagged behind at 72.9% and 71.8% respectively. By 2023, PENTA 1 coverage slightly increased to 84.9%, with PENTA 2 at 74.9% and PENTA 3 at 72.9%. While these figures demonstrate progress, they remain below the 85% herd immunity threshold required to halt diphtheria transmission.^{11,12,15}

This immunity gap has left large susceptible cohorts, especially children aged 5–15 years who were born during periods of extremely low coverage and never received booster doses. These groups now form the backbone of the outbreak.^{11,12,14,18} The concept of herd immunity is particularly critical in fragile settings, where health infrastructure is weak and vaccine supply is inconsistent. Without sufficient community-level protection, transmission chains remain uninterrupted, allowing diphtheria to resurge once introduced. Globally, sustained herd immunity has eliminated diphtheria as a public health threat in most countries, with DTP3 coverage in 2024 averaging about 85%. In contrast, fragile states such as Somalia, Nigeria, Chad, Ethiopia, and Yemen, where immunization systems are undermined by conflict and underinvestment continue to experience resurgences.^{8,17,19}

Furthermore, this commentary article presented data sources from multiple national and international surveillance platforms, primarily the Federal Ministry of Health, Somalia, Integrated Disease Surveillance and Response system and World Health Organization Somalia Situation Reports. Additional case data were obtained through district-level health offices, expanded program on immunization records, and partner-supported outbreak investigation reports.

Case Definitions

- Suspected Case: Any individual presenting with clinical features consistent with diphtheria (eg, sore throat, pseudomembrane in the throat, difficulty breathing, or cervical lymphadenopathy) as defined by WHO surveillance guidelines.
- Confirmed Case: A suspected case with laboratory confirmation of *Corynebacterium diphtheriae* infection by culture or real-time PCR assay conducted at a reference laboratory.

Policy Implications for Outbreak Preparedness

The recent diphtheria outbreak in Somalia has highlighted significant gaps in epidemic preparedness, particularly in conflict-affected and hard-to-reach regions where vaccination coverage remains low. To address these vulnerabilities, it is crucial to deploy mobile vaccination teams, ensure integration of immunization activities with broader humanitarian services, and implement rapid catch-up campaigns for unvaccinated populations. Strengthening the cold chain infrastructure, enhancing vaccine forecasting accuracy, and enforcing mandatory disease reporting by private healthcare providers are also essential steps. Therefore, adopting an integrated surveillance approach and fostering stronger inter-agency coordination would markedly improve Somalia's capacity to prevent and respond to future outbreaks.

Conclusion and Recommendations

Diphtheria outbreak in Somalia has highlighted significant deficiencies in vaccination coverage, underscoring the urgent need to strengthen routine immunization and introduce systematic Td boosters to close equity gaps among zero-dose populations and achieve herd immunity. Expanding surveillance system and laboratory services is crucial for timely detection, confirmation, and response, while ensuring consistent access to diphtheria antitoxin is vital for effective outbreak response, enabling timely treatment, reducing complications, and lowering mortality rates. Additionally, establishing a national outbreak coordination mechanism would strengthen response efforts, enhance case management, and facilitate integrated collaboration among partners. We are recommended to strengthen national immunization and Td booster programs, integrate diphtheria into surveillance systems, expand laboratory and antitoxin capacity, establish a coordinated outbreak response committee, standardize case management and IPC training, and implement risk communication to address vaccine hesitancy and raise community awareness.

Disclosure

The authors report no conflicts of interest in this work.

References

1. International Federation of Red Cross and Red Crescent Societies. Trends of Suspected Diphtheria case and deaths in Somalia, Distribution of Diphtheria cases by age and gender in 2025. Geneva: IFRC; 2025 Aug 18. Report No. 991:1–7.
2. Region N. Diphtheria outbreak investigation report. 2025:10–12.
3. Clarke KEN, MacNeil A, Hadler S, Scott C, Tiwari TSP, Cherian T. Global epidemiology of diphtheria, 2000–2017. *Emerg Infect Dis*. 2019;25(10):1834–1842. doi:10.3201/eid2510.190271
4. Osarenren J, Omosigbo PO, Okesanya OJ. Global strategies for addressing diphtheria resurgence epidemiology clinical impact and prevention. *Discov Public Heal*. 2024;21(1):219. doi:10.1186/s12982-024-00352-1
5. Hassan MS, Hossain MM. Determinants of vaccination status among Somali children: evidence from a Countrywide cross-sectional survey. *BMC Pediatr*. 2024;24(1). doi:10.1186/s12887-024-05334-5
6. Bile AS, Ali-Salad MA, Mahmoud AJ, et al. Assessing vaccination delivery strategies for zero-dose and under-immunized children in the fragile context of Somalia. *Vaccines*. 2024;12(2):1–22. doi:10.3390/vaccines12020154
7. Belay DB, Ali MI, Chen DG, Jama UA. Prevalence and associated factors of immunization among under-five children in Somalia. *BMC Public Health*. 2025;25(1). doi:10.1186/s12889-025-22122-7
8. Hassan MS, Abdulla F, Hossain M. Vaccination coverage and its associated factors among children under-5 in Somalia. *BMC Public Health*. 2025;25(1). doi:10.1186/s12889-025-21529-6
9. McDermott A. Herd immunity is an important—and often misunderstood—public health phenomenon. *Proc Natl Acad Sci U S A*. 2021;118(21):1–4. doi:10.1073/pnas.2107692118
10. Plans-Rubió P. Vaccination coverage for routine vaccines and herd immunity levels against measles and pertussis in the world in 2019. *Vaccines*. 2021;9(3):1–19. doi:10.3390/vaccines9030256
11. Dureab F, Al-Sakkaf M, Ismail O, et al. Diphtheria outbreak in Yemen: the impact of conflict on a fragile health system. *Confl Health*. 2019;13(1):1–7. doi:10.1186/s13031-019-0204-2
12. Polonsky JA, Ivey M, Anam Mazhar MK, et al. Epidemiological, clinical, and public health response characteristics of a large outbreak of diphtheria among the Rohingya population in Cox's Bazar, Bangladesh, 2017 to 2019: a retrospective study. *PLoS Med*. 2021;18(4):1–22. doi:10.1371/journal.pmed.1003587
13. Break DO. DREF operation. 2025:1–17.
14. Neal SE, Efstratiou A, Gabrielian S, et al. International external quality assurance for laboratory diagnosis of diphtheria. *J Clin Microbiol*. 2009;47(12):4037–4042. doi:10.1128/JCM.00473-09
15. Wagner A, Jasinska J, Schmid D, Kundi M, Wiedermann U. Lack of seroprotection against diphtheria in the Austrian population, in light of reported diphtheria cases in Europe, 2022. *Eurosurveillance*. 2023;28(17). doi:10.2807/1560-7917.ES.2023.28.17.2300206
16. Diseases V preventable. *Laboratory manuals_3a.pdf*. 2021.

17. Truelove SA, Keegan LT, Moss WJ, et al. Clinical and epidemiological aspects of diphtheria: a systematic review and pooled analysis. *Clin Infect Dis.* 2020;71(1):89–97. doi:10.1093/cid/ciz808
18. Vusirikala A, Tonge S, Bell A, et al. Reassurance of population immunity to diphtheria in England: results from a 2021 national serosurvey. *Vaccine.* 2023;41(46):6878–6883. doi:10.1016/j.vaccine.2023.10.003
19. Grandière Pérez L, Brisse S. Diphtheria antitoxin treatment: from pioneer to neglected. *Mem Inst Oswaldo Cruz.* 2025;120(September):e240214. doi:10.1590/0074-02760240214

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