



A Decade of Evidence Since the 2015 WHO Pertussis Position Paper: Implications for Global Vaccination Policy

Funding statement:	The publication of this article was funded by Sanofi.
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Disclaimer:	The opinions expressed in this article belong solely to the author.
Conflict of interest:	Macina is an employee of Sanofi and holds shares of the Sanofi group as part of his compensation.
Gen AI use:	No generative AI tools were used in the production of the article.
Acknowledgements:	Writing assistance was provided by FINN Partners, London, UK.
Received:	03.09.26
Accepted:	05.10.26
Keywords:	Global health, immunisation, pertussis, pertussis policy, vaccination in pregnancy, vaccination policy.
Citation:	EMJ Microbiol Infect Dis. 2026;7[Suppl 1]:2-6. https://doi.org/10.33590/emjmicrobiolinfectedis/LB3M6180



Abstract

Global pertussis cases surged nearly sixfold between 2023–2024, topping 941,000. This post-pandemic resurgence, paired with a decade of new evidence, underscores the need to update the 2015 WHO position paper.

To address these evolving challenges, the Global Pertussis Initiative (GPI), an expert group of over 350 specialists from 68 countries, developed a flexible, risk-based framework designed to help nations adapt vaccination strategies to their local epidemiology and resources.

The foundational objective remains preventing severe disease and death in infants under 6 months through maternal vaccination, combined with infant primary series. These are to be followed by sequential steps for expanding vaccination programmes through early-years boosters, school-entry boosters, adolescent boosters, and finally adult boosters. The sequence and scope of these additional strategies can be tailored based on country disease burden, programme feasibility, and available resources.

Policy updates must be paired with operational execution: securing supply chains to prevent stockouts, educating healthcare providers, addressing vaccine hesitancy, and strengthening PCR diagnostic and surveillance capacity.

An updated WHO reference will provide national advisory groups with a current, evidence-informed basis for implementing these strategies in a way that is tailored to the specific country circumstances and resources.

Key Points

1. Since the 2015 WHO pertussis position paper, disease epidemiology has changed substantially: reported global cases rose nearly sixfold, from approximately 163,000 in 2023 to more than 941,000 in 2024.
2. The Global Pertussis Initiative (GPI) has developed a prioritised, risk-based framework that can help countries consider additional strategies based on residual disease burden, local epidemiology, programme feasibility, equity, delivery capacity, and available resources.
3. The accumulated evidence warrants a formal WHO review of the 2015 position paper and consideration of updated recommendations to ensure that policies reflect current data.

PERTUSSIS EPIDEMIOLOGY AND THE EVIDENCE BASE HAVE EVOLVED SUBSTANTIALLY SINCE 2015

Pertussis all but disappeared during the height of the COVID-19 pandemic, then resurged across multiple WHO regions between 2022–2025. Reported cases rose nearly sixfold globally, from approximately 163,000 in 2023 to more than 941,000 in 2024, well above pre-pandemic levels of 100,000–200,000 annually.¹ The magnitude and timing have varied across countries and surveillance systems. Wider use of diagnostics such as PCR has increased detection in some settings, while limited testing elsewhere is likely to mask the true burden.

Reduced circulation and exposure during the pandemic, disruption to routine immunisation, and improved detection have each been cited as possible contributors to the resurgence. Their relative contribution is likely to differ by setting. Yet despite varied national contexts, one pattern remains universal: the disproportionate burden of severe pertussis falls on specific age groups and at-risk populations.

A decade of additional evidence published since the 2015 WHO position paper challenges some previous conclusions and recommendations, providing an opportunity to reassess whether the guidance continues to reflect current epidemiology, evidence, and programme needs.

THE FOUNDATIONAL OBJECTIVE: PROTECT NEWBORNS AND YOUNG INFANTS

Most severe morbidity, hospitalisation, and death occur in infants under 6 months, who are too young to have completed their primary series.² Provisional 2025 USA data recorded 28,783 cases overall: infants under 6 months had the highest incidence (120.0 per 100,000) and hospitalisation rate (41.2%), and 10 out of 16 reported deaths occurred in infants under 1 year.³ EU/European Economic Area (EEA) data from 2024 show the same pattern. Among 209,674 reported cases, infants under 1 year had the highest notification rate, at 318.5 per 100,000.⁴

Vaccination in pregnancy is the only vaccination strategy that provides direct protection before infants can complete their own primary series.⁵ Transplacental transfer of maternal antibodies provides 69–93% protection in infants under 2–3 months, while recent meta-analyses estimate overall vaccine effectiveness at 85%.^{5,6} Timely infant vaccination, together with tetanus, diphtheria, pertussis (Tdap) vaccination during pregnancy, should therefore form the foundational objective of pertussis control, adapted to national policy and delivery contexts.

WANING IMMUNITY EXTENDS THE BURDEN BEYOND INFANCY

Without a booster, protection wanes by around 6 years of age regardless of

whether whole-cell or acellular vaccine was used for the primary series.^{7–9} Studies indicate that waning occurs at a similar rate across vaccine types, reinforcing the need for boosters to sustain protection.¹⁰ A fourth dose restores antibody titres and provides 93% protective efficacy.¹¹ School-entry boosters achieve 93–98% direct effectiveness, protect children during years of elevated transmission between families, and address clinically significant disease, including cough and vomiting.^{11–14} School-age vaccination has also been associated with reductions of up to 40% in illness and hospitalisations among unvaccinated infants aged 0–6 months.¹⁵

Immunity following infection and subsequent boosters also wanes, leaving adolescents and adults susceptible to disease and able to transmit infection to more vulnerable groups. Although disease is often milder in adolescents and younger adults, older adults and people with chronic conditions face increased risks of hospitalisation and reduced quality of life.¹⁶ Of the pertussis deaths reported to the European Centre for Disease Prevention and Control (ECDC) in 2023 and early 2024, 42% occurred in adults aged 60 years and over.¹⁷

EFFECTIVE VACCINES EXIST, BUT ACCESS, COVERAGE, AND DELIVERY LIMIT IMPACT

Pertussis remains endemic despite widespread use of whole-cell and acellular vaccines. The reasons vary by setting and include gaps in access and primary-series coverage, missed vaccination opportunities, unequal coverage within countries, waning immunity, and vaccine hesitancy. Concerns about reactogenicity following earlier doses can also affect acceptance and schedule completion.^{18,19}

The pandemic widened existing coverage gaps. The WHO and United Nations Children's Fund (UNICEF) estimated that 20.5 million children missed at least one diphtheria, tetanus, polio (DTP) dose in 2022, including 14.3 million who received no dose.²⁰ National averages can also conceal marked inequalities between communities.²¹

Vaccination in pregnancy coverage is similarly uneven: reported coverage reached 88.5% in Spain and 76.0% in the UK, compared with 1.6% in Czechia and 8.8% in Romania.²² Booster recommendations and programmes are heterogeneous, and adult booster coverage rarely exceeds 30% even where vaccination is recommended.²³

These gaps suggest that policy revision alone is unlikely to be sufficient. Updated guidance should connect vaccination priorities with the delivery, procurement, surveillance, and communication measures needed to implement them equitably.

AN EVIDENCE-INFORMED, RISK-BASED FRAMEWORK

The Global Pertussis Initiative (GPI), established in 2001 and comprising more than 350 experts from 68 countries, has developed a prioritised framework for consideration. It is intended to support adaptation to different epidemiological and health-system settings rather than prescribe a uniform global schedule. The framework places prevention of severe disease and death among newborns and young infants first, then allows countries to consider progressively broader protection according to residual burden and capacity.

Core Priorities

1. Optimal protection of newborns, infants, and young children through Tdap vaccination during each pregnancy
2. High and timely coverage of the infant primary series
3. Expansion from DTP3 to DTP4 through a first booster in the second year of life

Additional Priorities for Consideration

- Improve the impact of existing delivery platforms and reduce missed immunisation opportunities
- Introduce or strengthen a school-entry booster
- Introduce an adolescent booster
- Consider risk-based adult boosters and opportunistic substitution of a tetanus and diphtheria vaccine with Tdap

The sequence and scope of these additional strategies should be determined by disease burden, local epidemiology, existing schedules, evidence of individual and population-level impact, programme feasibility, equity, financing, and available resources.

ADDITIONAL CONSIDERATIONS FOR SUCCESSFUL IMPLEMENTATION

Secure and Equitable Vaccine Supply

Reliable procurement underpins every level of the framework. Between 2015–2022, 94 countries experienced at least one national DTP stockout.²⁴ Depending on the country's context, mitigation may include advance purchase agreements, national stockpiling, pooled procurement mechanisms, and evidence-informed assessment of cost-effectiveness. Supply security, affordability, and equitable distribution must be considered alongside policy design.

Provider Awareness and Public Communication

HCPs translate policy into uptake, yet awareness remains uneven. In one European survey, 58% of primary-care professionals had never prescribed a pertussis vaccine to an adult, and only 17% viewed pertussis as an adult immunisation target.²⁵ Parental vaccine hesitancy increases a child's risk of pertussis fourfold and accounts for up to 25% of under-vaccination among children aged 19–35 months.^{26,27} Negative experiences of infant-vaccine reactogenicity can reduce acceptance and completion.¹⁹

Implementation should therefore include education for healthcare providers, public communication appropriate to the local context, and clear information about vaccine safety and tolerability. Barriers to uptake should also be monitored throughout implementation. Where reactogenicity affects acceptance, the availability of well-tolerated vaccine options is relevant, but platform choice should be assessed within the full evidence and programme context.

Surveillance and Diagnostic Capacity

Pertussis is frequently mistaken for other respiratory infections, and some countries lack mandatory notification or a functioning national reporting system.²⁸ Surveillance and diagnosis are essential to detect outbreaks, understand age-specific and risk-specific burden, guide the selection of vaccination strategies, and evaluate programme effectiveness. Strengthening these systems should therefore accompany any policy update.

Implications for WHO Policy

Evidence gathered since 2015 reaffirms a clear priority: preventing severe pertussis disease and death among newborns and young infants through timely infant vaccination and vaccination in pregnancy. It also points to the waning of vaccine-induced protection, regardless of the type of pertussis vaccine used in infancy, and thus strengthens the case for robust and prioritised booster strategies as resources support them. This does not imply that all countries should adopt the same vaccination schedule. Rather, it highlights the need for a clearer decision-making framework that can be applied consistently while taking national circumstances into account.

The WHO's 2015 position paper remains the principal global reference point, but it predates the current resurgence, a decade of evidence on maternal immunisation and waning protection, recent data on the burden in older adults, and new lessons on coverage disruption, supply security, and surveillance.

An updated position paper would not require every country to adopt every intervention. Its value would be to reaffirm the foundational objective of prioritising infant lives, then define the evidence and conditions for additional strategies, and provide national immunisation technical advisory groups with a current basis for decisions.

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