VACCINE DELIVERY RESEARCH DIGEST

UNIVERSITY OF WASHINGTON STRATEGIC ANALYSIS, RESEARCH & TRAINING (START) CENTER

REPORT TO THE GATES FOUNDATION

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1 The effects of orphanhood and lack of parental care on child vaccination: analyses of 189 cross-sectional UNICEF Multiple Indicator Cluster Surveys from 82 countries, 2005-2022.

{Abstract & START Commentary} {Full Article}

- Orphans and children without parental care were found to be at risk of sub-optimal vaccination.

2 Bridging immunization gaps: lessons from Zambia's 2024 measles-rubella supplementary immunisation activity.

{Abstract & START Commentary} {Full Article}

- The effectiveness of microplanning, the feasibility of real-time digital monitoring, and the equity of reaching zero-dose children during a 2024 measles-rubella supplementary immunization activity in Zambia were evaluated.

3 Characterizing adolescent vaccination in publicly funded national immunization programs in Latin America and the Caribbean: A review of the literature.

{Abstract & START Commentary} {Full Article}

- Gaps in accessibility and tracking infrastructure for adolescent immunizations were evaluated in this review of 50 countries and territories in Latin American and the Caribbean.

4 Estimating the historical impact of outbreak response immunisation programmes across 210 outbreaks in low and middle-income countries.

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- The impact outbreak response immunization programs were evaluated using data from measles, Ebola, yellow fever, cholera, and meningococcal meningitis outbreaks between 2000-2023.

5 A field test of empathetic refutational and motivational interviewing to address vaccine hesitancy among patients.

{Abstract & START Commentary} {Full Article}

- This study reports results from a mixed-methods field test in Romania of two conversational techniques to counter vaccine hesitancy.

6 Incentives in immunisation campaigns in low- and middle-income countries: a scoping review mapping evidence on effectiveness and unintended consequences.

{Abstract & START Commentary} {Full Article}

- Incentives were found to have positive short-term impacts on immunization coverage in this scoping review of 40 studies, but unintended consequences were noted.

7 Global, regional, and national trends in routine childhood vaccination coverage from 1980 to 2023 with forecasts to 2030: a systematic analysis for the Global Burden of Disease Study 2023.
{Abstract & START Commentary} {Full Article}

- Updated global, regional, and national estimates of routine childhood vaccine coverage from 1980 to 2023 for 204 countries and territories for 11 vaccine-dose combinations recommended by WHO were provided, and progress toward 2030 goals was evaluated.

8 Assessing the impact of heat waves on childhood immunization coverage in Sindh, Pakistan: Insights from 132.4 million doses recorded in the provincial electronic immunization registry (2018-2024).
{Abstract & START Commentary} {Full Article}

- High temperatures were found to disrupt vaccine service delivery leading to reduced immunization coverage, particularly in outreach program settings.

9 Evaluation of Interventions to Improve Vaccination Coverage Among Children Aged 12-23 Months in Urban Slum Areas of Bangladesh Using the WHO Interactive Evidence to Decision (iEtD) Framework: A Stakeholder Perspective.
{Abstract & START Commentary} {Full Article}

- Interventions to improve vaccination coverage among young children were identified in a literature review and were evaluated for acceptability and feasibility by stakeholders in slum areas in Bangladesh.

10 Vaccination against cholera in crisis: Coverage and cost efficiency in Sudan (2023-2024).
{Abstract & START Commentary} {Full Article}

- Immunization strategies, cold chain performance, social mobilization efforts, and operational costs per dose were evaluated during recent cholera outbreaks in Sudan were evaluated.

Additional Articles of Interest

Appendix

Details of Articles

1. The effects of orphanhood and lack of parental care on child vaccination: analyses of 189 cross-sectional UNICEF Multiple Indicator Cluster Surveys from 82 countries, 2005-2022.

Johri M, Munir M, Medeiros R, Shakya L, Damte B, Bolgrien A.

EClinicalMedicine. 2025 Jul 20;85:103314.

PubMed ID: 40678695

ABSTRACT

BACKGROUND: Children lacking parental protection may tend to miss out on essential services. We investigated whether orphans and children without parental care were at risk of sub-optimal vaccination.

METHODS: Cross-sectional analyses of 189 UNICEF Multiple Indicator Cluster Surveys from 82 predominantly low- and middle-income countries, conducted from January 1, 2005 to December 31, 2022. We used two-level logistic fixed-effects models with individual community-dwelling children aged 12-59 months nested within MICS sampling cluster to estimate the effects of orphanhood (one or both parents deceased) and lack of parental care (children residing with no biological parents) on missed vaccinations. We report the adjusted odds of being a “zero-dose” child (failure to receive any diphtheria-tetanus-pertussis-containing (DTP) vaccine doses), an under-immunised child (failure to receive three DTP doses), failure to receive any measles-containing vaccine (MCV), and failure to receive all eight basic vaccine doses.

FINDINGS: The analysis included 739,506 children of which 20.6% (n = 152,314) were zero-dose, 50.4% (n = 372,568) were under-immunised, 50.3% (n = 372,089) had not received any MCV, and 57.8% (n = 427,558) had not received all 8 basic vaccine doses. Orphans had a consistently higher risk of sub-optimal vaccination. Adjusted odds ratios were similar for all binary outcomes (zero-dose (ORadj 1.59; 95% CI: 1.48-1.71, $p < 0.001$), no DPT3 (ORadj 1.46; 95% CI: 1.38-1.54, $p < 0.001$), and no MCV and basic incomplete (ORadj 1.42; 95% CI: 1.34-1.50, $p < 0.001$ for both)). Children lacking parental care experienced similarly elevated risks of sub-optimal vaccination ($p < 0.001$ for all outcomes).

INTERPRETATION: To better support children at risk and uphold their rights, vaccination programmes should prioritise service delivery to orphans and children lacking parental care.

FUNDING: Eunice Kennedy Shriver National Institute of Child Health and Human Development and the Canadian Institutes for Health Research.

WEB: 10.1016/j.eclinm.2025.103314
IMPACT FACTOR: 10.0
CITED HALF-LIFE: 2.7

START COMMENTARY

Johri et al. evaluated four vaccination outcomes among children who had lost parents or who lived with someone other than their biological parent. The outcomes were 1) risk of incomplete vaccination defined as missing any of the 8 recommended childhood vaccine doses during the first year of life; 2) zero dose defined as having received no diphtheria, tetanus, pertussis vaccine (DPT) doses; 3) under-immunization defined as failure to receive all 3 DPT doses; and 4) failure to receive any measles-containing vaccine (MCV). Compared to children who had not lost a parent, those who had lost either or both of their parents were at elevated risk of all poor vaccine outcomes. Those who had lost their mother or both parents experienced similar risks for all outcomes, which were higher than those who had lost only their father (Figure 2). Children lacking parental care, defined not living with biological parents, were evaluated separately from those experiencing orphanhood and had higher risks of poor vaccine outcomes compared to those living with at least one biological parent. Understanding these risks can inform vaccine outreach programs, highlighting the need to prioritize those who have lost parents or live in situations where they lack parental care.

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2. Bridging immunization gaps: lessons from Zambia's 2024 measles-rubella supplementary immunisation activity.

Mwale M, Masumbu P, Chipimo P, Sakubita P, Phiri A, Matanda K, et al.

Front Public Health. 2025 Jul 18;13:1625514.

PubMed ID: 40678637

ABSTRACT

Zambia's 2024 Measles-Rubella Supplementary Immunization Activity (SIA), conducted from 23 to 28 September across all 116 districts, targeted children aged 9-59 months to address immunization gaps exacerbated by COVID-19 disruptions and responding to ongoing measles outbreaks. This community case study evaluates the effectiveness of microplanning, the feasibility of real-time digital monitoring, and the equity of reaching zero-dose children during Zambia's 2024 Measles-Rubella SIA, using a mixed-method approach to inform scalable immunization strategies in resource-limited settings. Through comprehensive microplanning, strategic community engagement, and real-time digital monitoring, the campaign achieved 97% national coverage and reached 165,000 previously zero-dose children in underserved communities. Implementation utilized Google Sheets and Open Data Kit tools, with quality assurance through over 7,500 supervisory visits. Despite achieving high overall coverage, several challenges emerged: funding delays, logistical constraints in remote areas, and data quality issues. Key lessons include the necessity of timely funding disbursement, strengthened cold chain infrastructure, and rigorous data verification processes. Community involvement through local leadership engagement and radio campaigns proved essential to success, while digital monitoring enabled rapid adaptation to emerging challenges. This case study provides actionable insights for designing equitable immunization campaigns in resource-limited settings, supporting global measles and rubella elimination goals through evidence of effectively tailored, data-driven strategies.

WEB: 10.3389/fpubh.2025.1625514

IMPACT FACTOR: 3.4

CITED HALF-LIFE: 2.7

START COMMENTARY

Planning began six months before the Measles-Rubella Supplementary Immunization Activity (SIA) described, with district-level microplans developed for each targeted area based on readiness assessments that identified infrastructure and operational gaps. Transportation difficulties, staffing concerns, and cold chain capacity issues were detailed. Health facilities identified catchment zones, estimated the number of eligible children, and identified vaccination sites. This information was consolidated at the district and provincial level, then submitted to the national program office, where

it was used to inform district-level vaccine procurement, target solutions for cold chain concerns, and identify transportation methods to access hard-to-reach areas. Nearly 30,000 health care workers and volunteers were trained for this SIA, and daily feedback meetings with district supervisors throughout the campaign helped to ensure data quality and provided opportunities to address emerging issues.

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3. Characterizing adolescent vaccination in publicly funded national immunization programs in Latin America and the Caribbean: A review of the literature.

Rojas M, Florencia Lución M, Becker Feijó R, Luevanos A, Gutierrez Tobar I, Estripeaut D, et al.
Hum Vaccin Immunother. 2025 Jul 11;21(1):2528403.
PubMed ID: 40643044

ABSTRACT

This review aimed to characterize adolescent vaccination schedules in publicly funded national immunization programs in Latin America and the Caribbean. The initial review identified vaccine type, target age and gender, dose schedule, and vaccination coverage rate (VCR) across 50 countries/territories in the region. A systematic review from January 2010-October 2023 was then conducted to identify primary data collection studies reporting VCRs. Overall, 42 webpages and 23 primary studies were identified. Among 47 countries/territories with ≥1 vaccine for adolescent immunization, human papillomavirus (HPV) vaccine was included in 45, tetanus component vaccines in 43, and meningococcal vaccines in 10. Catch-up vaccination for hepatitis B in 17, and yellow fever in all 13 endemic countries/territories. VCRs were primarily available for HPV. The findings of this review underscore the need to prioritize adolescent vaccination, improve accessibility, and strengthen tracking infrastructure to ensure comprehensive protection of this age group across the region.

WEB: 10.1080/21645515.2025.2528403
IMPACT FACTOR: 3.5
CITED HALF-LIFE: 4.8

START COMMENTARY

Immunization efforts in Latin America and the Caribbean have historically focused on childhood vaccination. While most countries in the region have incorporated adolescent vaccinations into their immunization programs, lack of structured reporting requirements led to inconsistent and limited reporting on vaccine coverage which makes it difficult to identify areas with vaccination gaps. Authors suggest investment in data infrastructure and reporting mechanisms for adolescent vaccines as a first step toward improving vaccination coverage. When designing vaccination campaigns targeting this age group, centrally coordinated school-based vaccination programs should be considered as these have been effective in Chile and Panama.

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4. Estimating the historical impact of outbreak response immunisation programmes across 210 outbreaks in low and middle-income countries.

Delport D, Muellenmeister A, MacKechnie G, Vaccher S, Mengistu T, Hogan D, et al.

BMJ Glob Health. 2025 Jul 09;10(7).

PubMed ID: 40633967

ABSTRACT

BACKGROUND: Outbreaks of vaccine-preventable diseases frequently occur in low and middle-income countries (LMICs), requiring outbreak response immunisation (ORI) programmes for containment. To inform future investment decisions, this study aimed to estimate the cases, deaths, disability-adjusted life years (DALYs) and societal economic costs averted by past ORI programmes. Outbreaks of measles, Ebola, yellow fever, cholera and meningococcal meningitis in LMICs between 2000 and 2023 were considered.

METHODS: 210 outbreaks (51 measles, 40 cholera, 88 yellow fever, 24 meningitis, 7 Ebola) across 49 LMICs were identified with sufficient data for analysis. Data were sourced from publicly available outbreak reports and literature. Agent-based models were calibrated for each disease such that after controlling for baseline vaccine coverage, response time, vaccination rate, environmental variables or endemic prevalence of the disease, observed outbreaks were within the distribution of simulated outbreaks. A status-quo and no ORI scenario were compared for each outbreak.

FINDINGS: Across 210 outbreaks, ORI programmes are estimated to have averted 5.81M (95% uncertainty interval 5.75M-5.87M) cases (4.01M measles, 283K cholera, 1.50M yellow fever, 21.3K meningitis, 820 Ebola), 327K (317K-338K) deaths (20.0K measles, 5215 cholera, 300K yellow fever, 1599 meningitis, 381 Ebola), 14.6M (14.1M-15.1M) DALYs (1.27M measles, 220K cholera, 13.0M yellow fever, 113K meningitis, 16.6K Ebola) and US$31.7B (29.0B-34.9B) (US$710M measles, US$156M cholera, US$30.7B yellow fever, US$97.6M meningitis, US$6.72M Ebola) in economic costs. Often, the more rapidly the ORI was initiated the greater impact.

INTERPRETATION: ORI programmes are critical for reducing the health and economic impacts of outbreaks of vaccine-preventable diseases.

WEB: 10.1136/bmjgh-2024-016887

IMPACT FACTOR: 6.1

CITED HALF-LIFE: 3.9

START COMMENTARY

Outbreak response immunization programs (ORIs) had greatest impacts when routine vaccination coverage was low and disease transmission rates were high. The greatest impact of quicker ORI response was seen in cholera and meningitis outbreaks as routine vaccination for these diseases has been limited. With measles and yellow fever, the lower time to ORI was still associated with better outcomes, but the population-level vaccination coverage also influenced outbreak outcomes. In areas where vaccination coverage was high, time to ORI had less impact as disease transmission rates were already low due to vaccine protection. The presence of ORI was estimated to reduce the expected number of large outbreaks for all diseases evaluated (Figure 6).

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5. A field test of empathetic refutational and motivational interviewing to address vaccine hesitancy among patients.

Fasce A, Mustață M, Deliu A, Holford D, Karlsson L, Gould V, et al.

NPJ Vaccines. 2025 Jul 08;10(1):142.

PubMed ID: 40610488

ABSTRACT

Vaccine hesitancy is among the most concerning public health issues due to declining immunization rates worldwide. We report a mixed-methods field test of two conversational techniques that allow for an empathetic dialogue on vaccination between health care professionals and patients: Empathetic-refutational interviewing (ERI) and motivational interviewing (MI). Thirty Romanian general practitioners were assigned to an untrained control group and to two experimental groups in which they were trained in ERI or MI. After training, physicians had conversations on HPV and influenza vaccines with 334 patients who were hesitant to receive a vaccination. Patients of physicians in the ERI group demonstrated larger increases in positive attitudes toward vaccines and willingness to get vaccinated, while a greater proportion of patients in the MI group scheduled vaccination appointments. Interviews with participating physicians revealed overall satisfaction with the conversational techniques. Empathetic interpersonal communication can have a substantial positive impact on vaccination rates, especially for vaccines subject to mass misinformation campaigns.

WEB: 10.1038/s41541-025-01197-8

IMPACT FACTOR: 6.5

CITED HALF-LIFE: 3.0

START COMMENTARY

Motivational interviewing is a patient-centered framework for health behavior change that emphasizes empathy, person-centered conversation, and building on inherent motivation for behaviors. MI skills include asking open-ended questions to identify patient concerns, reflective listening, and supporting autonomy while encouraging change. Empathetic-refutational interviewing also centers patient experiences, concerns and perspectives, but those employing ERI methods directly address misconceptions while showing empathy toward the patient's position by expressing understanding of their concerns and motivations. Although patients whose physicians used ERI methods had their misconceptions directly addressed and refuted, there was no difference in their satisfaction with the interaction with the physician when compared with those in the control and MI groups. Of note, despite having no special training in specific techniques to address vaccine hesitancy, physicians in the control group reported longer dedicated conversations about vaccination

with their vaccine-hesitant patients, likely due to being part of the study, and 50% of patients in the control group scheduled a vaccine appointment following their consultation.

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6. Incentives in immunisation campaigns in low- and middle-income countries: a scoping review mapping evidence on effectiveness and unintended consequences.

Saunders M, Pereboom M, Alvarez J, Sherlock M, Gadroen K.

BMJ Glob Health. 2025 Jun 30;10(6).
PubMed ID: 40588295

ABSTRACT

INTRODUCTION: Various incentive programmes are being used to improve immunisation uptake, despite limited understanding of their effectiveness and potential unintended consequences. We conducted a scoping review to map and synthesise evidence on their use in low- and middle-income countries (LMIC), compare experiences across regions and incentive types, and identify unintended consequences and implementation challenges.

METHODS: We searched Ovid MEDLINE and grey literature for studies published between 2000 and 2024 investigating incentives in immunisation campaigns in LMIC. We included quantitative and qualitative studies investigating monetary or non-monetary incentives provided conditionally or unconditionally on immunisation uptake. Data were synthesised narratively to summarise evidence on effectiveness, perceptions and attitudes and unintended consequences.

RESULTS: We included 40 studies from 19 countries (20 from Africa, 13 from Asia and seven from Latin America). Of these, 31 evaluated effectiveness through randomised trials (n=17) or quasi-experimental designs (n=14). Most evaluated monetary incentives for childhood immunisations, particularly conditional cash transfers, while some examined non-monetary incentives including food, mobile phone credit and symbolic rewards. While effect sizes varied substantially across different interventions and contexts, most studies demonstrated modest positive short-term effects on immunisation uptake, and no studies showed decreased uptake. However, several revealed unintended consequences, including reduced intrinsic motivation manifesting as lower immunisation uptake when incentives were withdrawn, creation of payment expectations and implementation challenges affecting acceptability. Several studies highlighted how incentive programmes could undermine community volunteerism and trust in both immunisation and health services, particularly when poorly implemented or withdrawn.

CONCLUSIONS: While incentives can improve short-term immunisation uptake in LMIC, their effects vary by context, and they can have negative unintended consequences which need to be taken into consideration in programme design. Future programmes should be co-designed with communities, consider locally acceptable non-monetary alternatives, incorporate strategies to maintain intrinsic motivation and ensure sustainable implementation within existing health systems.

WEB: 10.1136/bmjgh-2025-019662
IMPACT FACTOR: 6.1
CITED HALF-LIFE: 3.9

START COMMENTARY

While incentives generally improved immunization uptake, impacts varied by geographic region. For example, cash transfers in Nigeria and Somalia had large effects on immunization uptake but minimal to no impact in Kenya and Zimbabwe. Authors suggest that this may reflect differences in baseline immunization coverage, perceptions and attitudes towards immunization, health system capacity, and historical context. Co-development of incentive programs with community members to ensure incentives match community values can optimize the impact. Studies in Somalia and Madagascar found incentives were particularly effective among hard-to-reach and vulnerable communities where they may help to overcome structural and economic barriers to immunization. Qualitative studies in Kenya and India suggest non-monetary incentives that directly benefit children or mothers may have greater impact in settings where men control household finances as they are less likely to influence household power dynamics.

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7. Global, regional, and national trends in routine childhood vaccination coverage from 1980 to 2023 with forecasts to 2030: a systematic analysis for the Global Burden of Disease Study 2023.

Haeuser E, Byrne S, Nguyen J, Raggi C, McLaughlin SA, Bisignano C, et al.

Lancet 2025; Jul 19;406(10500):235-260.
PubMed ID: 40578370

ABSTRACT

BACKGROUND: Since its inception in 1974, the Essential Programme on Immunization (EPI) has achieved remarkable success, averting the deaths of an estimated 154 million children worldwide through routine childhood vaccination. However, more recent decades have seen persistent coverage inequities and stagnating progress, which have been further amplified by the COVID-19 pandemic. In 2019, WHO set ambitious goals for improving vaccine coverage globally through the Immunization Agenda 2030 (IA2030). Now halfway through the decade, understanding past and recent coverage trends can help inform and reorient strategies for approaching these aims in the next 5 years.

METHODS: Based on the Global Burden of Diseases, Injuries, and Risk Factors Study 2023, this study provides updated global, regional, and national estimates of routine childhood vaccine coverage from 1980 to 2023 for 204 countries and territories for 11 vaccine-dose combinations recommended by WHO for all children globally. Employing advanced modelling techniques, this analysis accounts for data biases and heterogeneity and integrates new methodologies to model vaccine scale-up and COVID-19 pandemic-related disruptions. To contextualise historic coverage trends and gains still needed to achieve the IA2030 coverage targets, we supplement these results with several secondary analyses: (1) we assess the effect of the COVID-19 pandemic on vaccine coverage; (2) we forecast coverage of select life-course vaccines up to 2030; and (3) we analyse progress needed to reduce the number of zero-dose children by half between 2023 and 2030.

FINDINGS: Overall, global coverage for the original EPI vaccines against diphtheria, tetanus, and pertussis (first dose [DTP1] and third dose [DTP3]), measles (MCV1), polio (Pol3), and tuberculosis (BCG) nearly doubled from 1980 to 2023. However, this long-term trend masks recent challenges. Coverage gains slowed between 2010 and 2019 in many countries and territories, including declines in 21 of 36 high-income countries and territories for at least one of these vaccine doses (excluding BCG, which has been removed from routine immunisation schedules in some countries and territories). The COVID-19 pandemic exacerbated these challenges, with global rates for these vaccines declining sharply since 2020, and still not returning to pre-COVID-19 pandemic levels as of 2023. Coverage for newer vaccines developed and introduced in more recent years, such as immunisations against pneumococcal disease (PCV3) and rotavirus (complete series; RotaC) and a

second dose of the measles vaccine (MCV2), saw continued increases globally during the COVID-19 pandemic due to ongoing introductions and scale-ups, but at slower rates than expected in the absence of the pandemic. Forecasts to 2030 for DTP3, PCV3, and MCV2 suggest that only DTP3 would reach the IA2030 target of 90% global coverage, and only under an optimistic scenario. The number of zero-dose children, proxied as children younger than 1 year who do not receive DTP1, decreased by 74·9% (95% uncertainty interval 72·1-77·3) globally between 1980 and 2019, with most of those declines reached during the 1980s and the 2000s. After 2019, counts of zero-dose children rose to a COVID 19-era peak of 18·6 million (17·6-20·0) in 2021. Most zero-dose children remain concentrated in conflict-affected regions and those with various constraints on resources available to put towards vaccination services, particularly sub-Saharan Africa. As of 2023, more than 50% of the 15·7 million (14·6-17·0) global zero-dose children resided in just eight countries (Nigeria, India, Democratic Republic of the Congo, Ethiopia, Somalia, Sudan, Indonesia, and Brazil), emphasising persistent inequities.

INTERPRETATION: Our estimates of current vaccine coverage and forecasts to 2030 suggest that achieving IA2030 targets, such as halving zero-dose children compared with 2019 levels and reaching 90% global coverage for life-course vaccines DTP3, PCV3, and MCV2, will require accelerated progress. Substantial increases in coverage are necessary in many countries and territories, with those in sub-Saharan Africa and south Asia facing the greatest challenges. Recent declines will need to be reversed to restore previous coverage levels in Latin America and the Caribbean, especially for DTP1, DTP3, and Pol3. These findings underscore the crucial need for targeted, equitable immunisation strategies. Strengthening primary health-care systems, addressing vaccine misinformation and hesitancy, and adapting to local contexts are essential to advancing coverage. COVID-19 pandemic recovery efforts, such as WHO's Big Catch-Up, as well as efforts to bolster routine services must prioritise reaching marginalised populations and target subnational geographies to regain lost ground and achieve global immunisation goals.

FUNDING: The Bill & Melinda Gates Foundation and Gavi, the Vaccine Alliance.

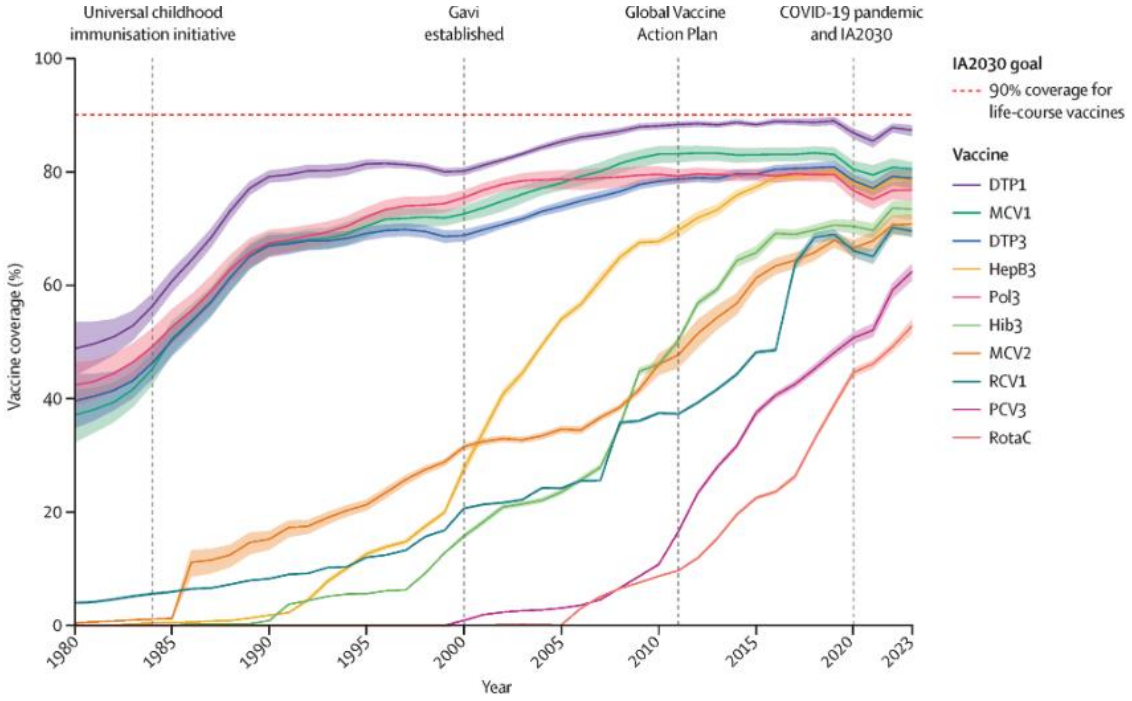
WEB: 10.1016/s0140-6736(25)01037-2
IMPACT FACTOR: 88.5
CITED HALF-LIFE: 7.8

START COMMENTARY

Vaccine coverage estimates by target age for each vaccine were calculated annually from 1980-2023 (Figure 1A, below) and by region (Figure 1B). The dashed horizontal line indicates the IA2030 goal of 90% coverage. The positive impact of Gavi and the Global Vaccine Action Plan and the disruptive impact of the COVID-19 pandemic can be seen for the vaccines. While the overall trend is

increasing, coverage for measles-containing vaccine (MCV1), dose 3 of diphtheria/tetanus/pertussis vaccine (DTP3), and dose 3 of poliovirus vaccine (Pol3) declined in 100, 98, and 107 countries and territories, respectively, between 2010-2019.

Figure 1A. Global estimates of vaccine coverage over time



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8. Assessing the impact of heat waves on childhood immunization coverage in Sindh, Pakistan: Insights from 132.4 million doses recorded in the provincial electronic immunization registry (2018-2024).

Siddiqi D, Iftikhar S, Anfossi C, Siddique M, Shah M, Dharma V, et al.
Vaccine. 2025 Jun 26;13(6).

ABSTRACT

INTRODUCTION: Heat waves, intensified by climate change, are increasingly challenging health systems, particularly in low- and middle-income countries (LMICs). Pakistan, ranked among the top 10 most climate-vulnerable nations, faces significant challenges in maintaining routine immunization coverage rates amid soaring temperatures. This study examines the impact of heat waves on immunization delivery in Sindh Province of Pakistan, a region highly vulnerable to climate-induced disruptions.

METHODS: We analyzed child-level data from the provincial electronic immunization registry for 132.4 million immunization doses administered between January 1, 2018, to July 31, 2024. We used the clustered panel univariate and multivariable Poisson and negative binomial regressions to analyze the association between high temperature alert days (33 °C to 39.9 °C) and heat waves (> 40 °C) and immunizations, by vaccination modality (fixed site, routine outreach, enhanced outreach). The analysis controlled for external shocks, such as floods, the COVID-19 pandemic, and vaccinators' strikes, and accounted for geographic and temporal variation.

RESULTS: Heat waves and high temperature alert days (≥33 °C) significantly reduced immunizations, with routine and enhanced outreach activities being most affected (13.6 % and 21.2 % decline respectively). Fixed-site immunizations witnessed a comparatively lower decline i.e. 5.8 %. Rural Divisions Larkana and Sukkur were disproportionately affected, while Karachi exhibited minimal impact. Despite the negative impact of heat waves, immunization efforts intensified during external shocks like floods and the COVID-19 pandemic, particularly through prolonged and frequent outreach activities.

DISCUSSION: Heat waves disrupted vaccine service delivery leading to reduced immunization coverage in Sindh, disproportionately affecting immunizations administered through outreach activities. Geographic and temporal variations highlight the need for localized strategies, including improved infrastructure, optimized outreach schedules, and robust vaccine cold chains. Future research should explore long-term adaptive strategies for maintaining vaccination coverage amid increasing impact of climate change, especially in low-resource settings.

WEB: 10.1016/j.vaccine.2025.127424
IMPACT FACTOR: 3.5
CITED HALF-LIFE: 8.2

START COMMENTARY

The impact of extreme heat varied by geographic region, with rural districts experiencing more severe declines in immunization uptake than the urban area of Karachi. This is likely due to more robust infrastructure, healthcare access, and heat mitigation strategies in urban areas. Outreach programs may have been more affected than fixed clinics because of heat-related disruptions in the cold chain, power outages, and heat-related health issues among health workers exposed to extreme heat during travel. While heat waves were associated with reduced immunizations over the 5-year period, immunizations uptake remained stable or increased slightly during some periods of extreme heat. This may be due to targeted vaccine campaigns, improved planning, and community demand.

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9. Evaluation of Interventions to Improve Vaccination Coverage Among Children Aged 12-23 Months in Urban Slum Areas of Bangladesh Using the WHO Interactive Evidence to Decision (iEtD) Framework: A Stakeholder Perspective.

Salahin K, Wichaidit W, Islam Q, Liabsuetrakul T.

Eval Health Prof. 2025 Jun 24;61:127424.

PubMed ID: 40570743

ABSTRACT

Childhood vaccination is the most cost-effective public health intervention; however, coverage in slum-like areas remains a significant challenge because of unique socio-economic disparities and logistical barriers. We aimed to evaluate the interventions from the literature on improving vaccination coverage among children aged 12-23 months in slum areas using the WHO iEtD framework and the TOPSIS-Entropy method for decision-making in Bangladesh and identify stakeholders ranks and felt needs of interventions across study slums. This cross-sectional study was conducted in six slums in two city corporation areas in Dhaka, Bangladesh involving 67 demand-side and 35 supply-side stakeholders. Rating scores ranged from 0 to 1, indicating priority interventions. Our study highlights that demand-side stakeholders favour incentive interventions, whereas supply-side stakeholders support multicomponent strategies. For all stakeholders, educational interventions were ranked highest with a score of 0.745, followed by multicomponent interventions (score 0.666), incentive (score 0.651), and reminder/recall scoring (score 0.305). Educational interventions were identified as a shared priority (common ground), addressing the felt needs of both demand- and supply-side stakeholders. These findings support tailored context-specific approaches to enhance vaccination coverage and child health in vulnerable communities.

WEB: 10.1177/01632787251353747

IMPACT FACTOR: 1.6

CITED HALF-LIFE: 11.7

START COMMENTARY

Overall, 67 caregivers from 6 slum areas in Bangladesh (demand-side stakeholders) and 35 representatives from government, healthcare, academics, and private sector organizations (supply-side stakeholders) were asked to evaluate interventions shown to increase vaccine uptake. Interventions were categorized as education, incentive, reminder/recall or multicomponent. Stakeholders ranked each intervention according to how well they felt the intervention would work to improve coverage among children aged 12-23 months. Criteria for ranking included policy importance, equity, acceptability, feasibility, and sustainability. Caregivers ranked incentive interventions highest as they addressed financial and accessibility barriers, while supply-side

stakeholders ranked multicomponent interventions highest. Both groups ranked education interventions second overall, and reminder/recall interventions lowest. Rankings varied across the 6 slum areas, highlighting the importance of tailoring vaccination strategies to local context.
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10. Vaccination against cholera in crisis: Coverage and cost efficiency in Sudan (2023-2024).

Izzoddeen A, Elhussien M, Abdalla O, Rashid M, Elbukhari Ibrahim M, Eltayeb D.
Vaccine. 2025 Jun 23:1632787251353747.

ABSTRACT

BACKGROUND: Cholera remains a persistent public health challenge, particularly in resource-limited and conflict-affected settings where inadequate water, sanitation, and hygiene infrastructure exacerbate disease transmission. Sudan has experienced recurrent cholera outbreaks, with two major waves occurring between April 2023 and November 2024, affecting 63,112 individuals and resulting in 1377 fatalities. Given the ongoing armed conflict and humanitarian crisis, traditional cholera prevention measures are often insufficient, necessitating the rapid deployment of Oral Cholera Vaccine (OCV) as a key outbreak response strategy.

METHODS: This study evaluates the administrative coverage, operational performance, and economic efficiency of Sudan's OCV campaigns during this period. A cross-sectional analysis was conducted on Sudan's nationwide OCV campaigns from November 2023 to November 2024. The study assessed vaccination strategies, cold chain resilience, social mobilization efforts, and operational costs per dose.

RESULTS: A total of 8,584,190 doses were administered to a target population of 8,654,546, achieving an administrative coverage rate of 99%. Coverage varied across implementation sites. The campaign was conducted under extreme conflict conditions, requiring innovative strategies such as house-to-house vaccination, mobile teams, and integration with novel Oral Polio Vaccine (nOPV) campaigns. Vaccine wastage was minimal (<0.0001 %), and the average operational cost per dose was $0.65. Despite logistical challenges, Sudan reduced the lead time from outbreak confirmation to vaccine request submission to just three days, though vaccine arrival delays of 2-4 weeks remained a bottleneck.

CONCLUSION: Sudan's experience demonstrates the feasibility and cost-effectiveness of OCV campaigns in conflict-affected and resource-limited settings. The high coverage rate, efficient vaccine utilization, and successful adaptation of vaccination strategies highlight the resilience of Sudan's health system in responding to outbreaks amid ongoing conflict and provide critical insights for future cholera control efforts in fragile settings, using partnerships, agile vaccine deployment mechanisms, and innovative implementation approaches.

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IMPACT FACTOR: 3.5
CITED HALF-LIFE: 8.2

START COMMENTARY

The cholera vaccination sub-committee in Sudan tailored campaign strategies based on local context to optimize coverage. In an area experiencing heavy fighting, officials coordinated with humanitarian groups and youth groups delivering food and medical assistance to identify the number of oral cholera vaccine doses needed and to deliver doses. In two other areas, house-to-house campaigns were conducted initially targeting those most at risk using surplus vaccines from a previous campaign effort, then expanding to include others when more doses were authorized. After a successful small-scale integration of an OCV campaign with a planned novel oral polio vaccine (nOPV) campaign, the strategy was expanded to cover two additional areas and achieved high coverage rates for both nOPV and OCV. This flexibility and adaptability facilitated campaign success.

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Additional Articles of Interest

1 Polio vaccination campaigns in conflicts: succeeding while other humanitarian efforts fail? {Full Article}
2 Prevalence and predictors of parental willingness to vaccinate daughters against human papillomavirus in Sub-Saharan Africa: a systematic review and meta-analysis. {Full Article}
3 Between war and pestilence: the impact of armed conflicts on vaccination efforts: a review of literature. {Full Article}
4 Investigating persistent measles dynamics associated with population immunity in Chad: a national secondary data model analysis from 2011 to 2025. {Full Article}
5 Cost-effectiveness analyses of 20-valent pneumococcal conjugate vaccine in children and adults: A narrative review. {Full Article}
6 Spatial distribution and associated factors of zero-dose immunization among 12-23 month-old children in Ethiopia: spatial and survey regression analysis. {Full Article}
7 Regional Disparities and Maternal Sociodemographic Determinants of Full Immunization Coverage Among Children Aged 12-23 Months in Nigeria: Insights from NDHS 2018. {Full Article}
8 Group B Streptococcus vaccine update: A crucial public health initiative for India. {Full Article}
9 Effectiveness and determinants of narrative-based corrections for health misinformation: A systematic review. {Full Article}
10 A consensus mathematical model of vaccine-induced antibody dynamics for multiple vaccine platforms and pathogens. {Full Article}
11 Machine learning approaches to dissect hybrid and vaccine-induced immunity. {Full Article}
12 HPV vaccine uptake among adolescent girls in Nigeria: The complex role of caregivers' education. {Full Article}
13 Addressing the challenges of estimating the target population in calculation of routine infant immunization coverage in Kenya. {Full Article}
14 Challenges and enablers in measles vaccination implementation in Ethiopia: Insights from a qualitative study. {Full Article}
15 Global burden of diphtheria, 1990-2021: a 204-country analysis of socioeconomic inequality based on SDI and DTP3 vaccination differences before and after the COVID-19 pandemic (GBD 2021). {Full Article}
16 Evaluation of immunization service delivery in primary healthcare centers in Akinyele and Lagelu local government areas, Oyo State, Nigeria. {Full Article}
17 Cost-effectiveness and benefit-risk of rotavirus vaccination in Afghanistan: a modelling analysis informed by post-licensure surveillance. {Full Article}

18 Inequalities in full immunization coverage among one-year-olds in the Democratic Republic of the Congo, 2007-2017. {Full Article}
19 Rebuilding vaccine confidence in Latin America and the Caribbean: strategies for the post-pandemic era. {Full Article}
20 Building vaccine confidence through empathy and evidence-based communication. {Full Article}
21 Contributions of District Health Information Software 2 (DHIS2) to maternal and child health service performance in Ethiopia: an interrupted time series mixed-methods study. {Full Article}
22 Overcoming dengue vaccine challenges through next-generation virus-like particle immunization strategies. {Full Article}
23 Understanding vaccine recommendation behaviours among healthcare workers in Senegal: A cross-sectional analysis. {Full Article}
24 Present and future prospects of vaccines: protecting humanity against emerging and re-emerging infectious diseases. {Full Article}
25 Strengthening Vaccine Safety Systems, Research, and Regional Collaboration in Africa: A Call to Action. {Full Article}
26 Real-World Impact of Pneumococcal Conjugate Vaccines on Vaccine Serotypes and Potential Cross-Reacting Non-Vaccine Serotypes. {Full Article}
27 Strengthening National Regulatory Authorities in Africa: A Critical Step Towards Enhancing Local Manufacturing of Vaccines and Health Products.{Full Article}
28 Construction of Development Scores to Analyze Inequalities in Childhood Immunization Coverage: A Global Analysis from 2000 to 2021. {Full Article}
29 “We have to amplify what we saw at EBOVAC” - Assessing participant perceptions, attitudes, and acceptability of an ancillary care policy in an Ebola vaccine trial in the Democratic Republic of the Congo: A mixed methods study. {Full Article}
30 Seroprevalence of Immunoglobulin G against measles and rubella over a 12-year period (2009-2021) in Kilifi, Kenya and the impact of the Measles-Rubella (MR) vaccine campaign of 2016. {Full Article}
31 Fever pitch: Coloniality and contention within community health’s yellow fever response in Kenya. {Full Article}
32 Trends in uptake and impact of thermostable vaccines in Africa. {Full Article}
33 The global economic burden of antibiotic-resistant infections and the potential impact of bacterial vaccines: a modelling study. {Full Article}
34 Framing the Future: How Vaccination Messages Shape Childhood Immunization Beliefs and Intentions Among Urban Low-Income Communities - a Randomized Field Experiment. {Full Article}

Appendix

The literature search for the August 2025 Vaccine Delivery Research Digest was conducted on July 24, 2025. We searched English language articles indexed by the US National Library of Medicine and published between June 15, 2025 and July 14, 2025. The search resulted in 495 items.

SEARCH TERMS

((((“vaccine”[tiab] OR “vaccines”[tiab] OR “vaccination”[tiab] OR “immunization”[tiab] OR “immunisation”[tiab] OR “vaccines”[MeSH Terms] OR (“vaccination”[MeSH Terms] OR “immunization”[MeSH Terms])) AND (“logistics”[tiab] OR “supply”[tiab] OR “supply chain”[tiab] OR “implementation”[tiab] OR “expenditures”[tiab] OR “financing”[tiab] OR “economics”[tiab] OR “Cost effectiveness”[tiab] OR “coverage”[tiab] OR “attitudes”[tiab] OR “belief”[tiab] OR “beliefs”[tiab] OR “refusal”[tiab] OR “Procurement”[tiab] OR “timeliness”[tiab] OR “systems”[tiab])) OR “vaccine delivery”[tiab] OR “vaccination refusal”[MeSH Terms] OR “immunization programs”[MeSH Terms] OR “zero dose”[tiab] OR “unvaccinated children”[tiab] OR “gavi”[tiab]) NOT (“in vitro”[tiab] OR “immune response”[tiab] OR “gene”[tiab] OR “chemistry”[tiab] OR “genotox*”[tiab] OR ”sequencing”[tiab] OR ”nanoparticle*”[tiab] OR “bacteriophage”[tiab] OR “exome”[tiab] OR “exogenous”[tiab] OR “electropor*“[tiab] OR”systems biology”[tiab] OR “animal model”[tiab] OR “cattle”[tiab] OR “sheep”[tiab] OR “goat”[tiab] OR “rat”[tiab] OR “pig”[tiab] OR “mice”[tiab] OR “mouse”[tiab] OR “murine”[tiab] OR “porcine”[tiab] OR “ovine”[tiab] OR “rodent”[tiab] OR “fish”[tiab])) AND “English”[Language] AND 2025/06/15:2025/07/14[Date - Publication]