VACCINE DELIVERY RESEARCH DIGEST

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

REPORT TO THE GATES FOUNDATION

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Additional Articles of Interest

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1. Evaluating the impact and cost-effectiveness of typhoid conjugate vaccine schedules across diverse settings: A multi-model comparison.

Wenger C, Grantz K, Menkir T, Muellenmeister A, Pithawala Z, Hutubessy R, et al.

PLoS Med. 2026 Oct 13;23(10):e1005280.

PubMed ID: 42868196

ABSTRACT

BACKGROUND: Given emerging evidence on the waning of immunity from typhoid conjugate vaccines (TCV), the World Health Organization (WHO) commissioned a multi-model comparison to determine the optimal schedule in terms of health and economic impact to inform updated recommendations for TCV use across different settings.

METHODS AND FINDINGS: To identify optimal vaccination strategies across different incidence settings and vaccine waning assumptions, we compared two agent-based and two compartmental dynamic models of typhoid transmission. All models were fitted to harmonized age-specific incidence data from medium, high, and very high incidence settings. We assessed different TCV schedules under slow- and fast-waning scenarios to evaluate the best age for routine vaccination and the potential need for booster doses and catch-up campaigns. We evaluated the public health and economic impact predicted for each model and scenario using the net-monetary-benefit framework to determine cost-effectiveness under two representative scenarios for the health outcomes and costs of vaccination and treatment. Over a 10-year time horizon, routine vaccination at 9 months with a catch-up campaign to 15 years and a booster dose at 5 years was predicted to have the greatest impact, reducing cases by a median of 40%-68% across the incidence settings. Across all four models, TCV introduction with a catch-up campaign was cost-effective above willingness-to-pay (WTP) thresholds of $1,250 per disability-adjusted life-year (DALY) averted in medium incidence settings when costs of illness and case fatality risk (CFR) are high and in high incidence settings when costs and CFR are low. The optimal strategy was to delay vaccination to 2 or 5 years of age if waning is fast, depending on the age of peak incidence. In very high incidence settings, TCV introduction at 9 months or 2 years of age was cost-saving, and adding a booster dose at 5 years was cost-effective at most WTP values across all scenarios. The study findings are limited by the data available to inform indirect vaccine protection and other simplifying assumptions made in this analysis.

CONCLUSIONS: Model predictions for the impact and cost-effectiveness of different TCV schedules were fairly robust to uncertainty in parameter values and model structure, but the optimal strategy depends on the typhoid incidence rate, CFR, and waning rate of vaccine protection.

WEB: 10.1371/journal.pmed.1005280
IMPACT FACTOR: 9.9
CITED HALF-LIFE: 10.0

START COMMENTARY

This multi-model comparison evaluated four typhoid conjugate vaccine (TCV) strategies to identify the most cost-effective schedule that maximizes health impact. Strategies included routine vaccination at ages: 9 months, 2 years, or 5 years, each with a catch-up campaign targeting children up to 15 years, or routine vaccination at 9 months with a booster at 5 years. The booster strategy produced the greatest health impact, reducing cases by an estimated 40-68% across incidence settings. However, no single strategy was most cost-effective across all scenarios. Assuming vaccine protection waned rapidly, delaying routine vaccination until 2 or 5 years of age was often more cost-effective than vaccinating at earlier ages, depending on the age distribution of typhoid incidence. Vaccination was more cost-effective in modeled Africa scenarios than Asia scenarios due to assumed higher case fatality rates and higher treatment costs. These findings highlight the importance of considering local epidemiology, vaccine protection, and economic conditions when determining optimal TCV schedules.

A key strength of this study was that four modeling groups separately evaluated TCV implementation strategies and compared results. There was general agreement regarding health benefit and the most cost-effective strategies, strengthening confidence in the findings. However, limited evidence on indirect vaccine protection and simplifying modeling assumptions introduce uncertainty into the estimated benefits of vaccination. While TCV introduction could substantially reduce typhoid burden, the authors note that vaccination alone will not eliminate typhoid. TCV implementation should complement ongoing improvements in water, sanitation, and hygiene and antimicrobial stewardship.
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2. Prevalence and determinants of hepatitis B vaccination uptake among pregnant women in sub-Saharan Africa: a systematic review and meta-analysis.

Afolabi I, Phillips J, El-Chaâr D, Bainbridge S, Phillips K.

BMJ Open. 2026 Oct 12;16(10):e123877.
PubMed ID: 42864135

ABSTRACT

OBJECTIVE: Despite more than two decades of hepatitis B vaccination implementation across sub-Saharan Africa (SSA), hepatitis B virus (HBV) remains hyperendemic in the region, with vertical transmission an important route of infection. However, there is a lack of regional evidence on HBV vaccination uptake among pregnant women, a priority population in HBV prevention. This systematic review and meta-analysis aimed to estimate the prevalence of HBV vaccination uptake and identify its determinants among pregnant women in SSA.

DESIGN: Systematic review and random-effects meta-analysis conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

DATA SOURCES: Following prospective registration (PROSPERO), we searched MEDLINE, Embase, Web of Science and Scopus for peer-reviewed studies published up to August 2026, supplemented by African Journals Online and Google Scholar.

ELIGIBILITY CRITERIA FOR SELECTING STUDIES: Observational studies reporting HBV vaccination uptake among pregnant women in SSA countries were included.

DATA EXTRACTION AND SYNTHESIS: Two reviewers independently screened studies, extracted data and assessed methodological quality using the Joanna Briggs Institute checklist for analytical cross-sectional studies. A random-effects meta-analysis was performed to estimate pooled prevalence. Subgroup and meta-regression sensitivity analyses explored sources of heterogeneity and robustness of findings. Determinants of vaccination uptake were synthesised narratively.

RESULTS: Of 1041 records screened, 21 studies involving 15 804 pregnant women from seven SSA countries were included. The pooled prevalence of HBV vaccination uptake was 18% (95% CI 14% to 21%) with substantial heterogeneity (I^2=99.2%) observed. Studies from West Africa (12; n=8062) reported higher vaccine uptake (24%, 95% CI 17% to 31%; p<0.001). Available studies identified socioeconomic, behavioural and healthcare-related factors associated with uptake, though evidence was limited. Evidence of small-study effects or potential publication bias was observed (Egger's test, p<0.001). The overall certainty of evidence was considered very low using the Grading

of Recommendations Assessment, Development and Evaluation (GRADE) approach, reflecting serious concerns regarding inconsistency, risk of bias and small-study effects.

CONCLUSIONS: HBV vaccination uptake among pregnant women in SSA remains suboptimal and represents an important unmet need for preventing vertical transmission. Targeted, context-specific interventions to improve awareness, access and integration of vaccination into antenatal care services are needed to enhance uptake. Future research should examine barriers and evaluate interventions to increase vaccination coverage in this priority population.

WEB: 10.1136/bmjopen-2026-123877
IMPACT FACTOR: 2.5
CITED HALF-LIFE: 5.3

START COMMENTARY

This systematic review and meta-analysis highlighted substantial gaps in hepatitis B virus (HBV) vaccination coverage among pregnant women in sub-Saharan Africa (SSA), with pooled uptake estimated at just 18% across 21 studies including 15,804 women. Evidence on determinants of vaccination uptake was limited, with only four studies reporting associated factors. Higher educational attainment, healthcare-related employment, receiving care at tertiary facilities, and greater HBV knowledge and behavioral skills were all associated with higher uptake. These findings suggest that both individual-level knowledge and broader health system factors may influence vaccination access. However, the limited and heterogeneous evidence makes it difficult to establish which factors are influential or identify populations at risk of remaining unvaccinated. Although the authors suggest a possible increase in reported vaccination coverage over time, they note that this trend should be interpreted cautiously given the small number of included studies. The findings highlight an opportunity to integrate HBV prevention more effectively into reproductive and maternal healthcare services.

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3. Precision immunisation: reaching zero-dose children in underserved communities in Niger State, Nigeria.

Jimoh A, Asaolu S, Jiya D, Enwezor O, Kpantu A, Salisu A, et al.

BMJ Glob Health. 2026 Oct 06;11(10).

PubMed ID: 42838605

ABSTRACT

Nigeria has one of the highest burdens of zero-dose children globally, particularly in underserved and hard-to-reach communities where routine immunisation systems face persistent barriers. In Niger state, these challenges are compounded by insecurity, seasonal flooding and dispersed populations, limiting the effectiveness of conventional facility-based approaches. We describe the implementation of the Strengthening Routine Immunization in Consequential Areas of Niger State (STRICAN) initiative, which applied a precision immunisation approach to identify and reach previously unreached children. The model combined household-level enumeration, geographical information system-enabled microplanning through a digital Micro Coverage Tracking Tool and community-based mobilisation using Community Health Influencers, Promoters, and Services agents and local leadership structures. Across 10 local government areas, the initiative generated granular data on settlements and under-five children, enabling targeted service delivery through a mix of outreach, mobile and facility-based strategies. Vaccination activities were adapted in real time to contextual challenges, including insecurity, poor network connectivity and population displacement. This implementation experience highlights the importance of integrating digital tools with trusted community systems to improve identification, tracking and service delivery for zero-dose populations. Key lessons include the value of data-driven microplanning, flexible delivery strategies in fragile settings and strong partnerships between government and implementing actors. The STRICAN model offers practical insights for policymakers and programme implementers seeking to strengthen routine immunisation systems and reach underserved populations in similar contexts.

WEB: 10.1136/bmjgh-2025-023058

IMPACT FACTOR: 5.8

CITED HALF-LIFE: 4.5

START COMMENTARY

The STRICAN initiative in Niger State, Nigeria, offers a useful example of how granular population data can be translated into targeted immunization delivery. Through household enumeration across 10 local government areas, the program identified 83,675 zero-dose children among 255,626

children under five (32.7%). A key feature was the use of GIS-enabled microplanning with community-based identification and mobilization. Community Health Influencers, Promoters, and Services (CHIPS) agents and Ward Focal Persons helped validate vaccination status, trace missing children, and link families with services.

The program's adaptability to local operational challenges was also noteworthy, with mobile teams reaching more remote communities using boats and canoes. Teams also switched to paper-based data collection when network connectivity was limited and adjusted implementation in response to insecurity and flooding. Despite these challenges, the initiative reports vaccinating 34,666 zero-dose children and developing GIS-informed microplans for routine immunization facilities across the 10 LGAs, highlighting the importance of operational flexibility in translating precision microplanning into effective vaccine delivery.

A strength of this initiative is its practical demonstration of how digital mapping tools and community networks can be combined to identify and reach zero-dose children in hard-to-reach settings. However, this is an implementation account rather than a comparative impact evaluation, so the independent contribution of individual strategies and the sustainability of coverage gains remain unclear. Future work should examine longer-term retention, completion of vaccination schedules, cost-effectiveness, and integration of these approaches into government-funded routine immunization systems.

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4. Adult vaccination in people living with HIV attending a tertiary centre infectious diseases clinic.

Muchichwa M, Murray L, Stacey S, Feldman C.

South Afr J HIV Med. 2026 Oct 06;27(1):1819.
PubMed ID: 42835647

ABSTRACT

BACKGROUND: People living with HIV (PLWH) are at increased risk of acquiring vaccine-preventable diseases and of developing severe illness because of their underlying immunodeficiency. Despite this risk, vaccination coverage remains low among these patients. International and local guidelines exist to address immunisation recommendations in PLWH, but evidence on adherence, knowledge, and attitudes toward vaccination in this population remain limited.

OBJECTIVES: The aim of the study was to investigate vaccination uptake, knowledge, and acceptance among PLWH.

METHOD: Interviews and retrospective file reviews were undertaken among PLWH attending the Charlotte Maxeke Johannesburg Academic Hospital Infectious Diseases Clinic from 01 June 2023 to 30 June 2023.

RESULTS: A total of 107 PLWH were interviewed, of whom 72 were women (67.3%), with a mean age of 47 years. Most (76.6%) had a prior history of tuberculosis. Overall, 24.3% had received at least one vaccine after their HIV diagnosis, of which influenza was the most common (76.9%). Only four vaccines, namely those against influenza, hepatitis B, herpes zoster and pneumococcus, were known to, or had been received by, the patients. While 65% believed vaccines could prevent disease, and 41.1% thought they could be harmful, notably 67.2% were willing to accept a vaccine if recommended by a healthcare provider.

CONCLUSION: Our study revealed low vaccination rates amongst PLWH in Johannesburg, South Africa, specifically regarding guidelines from the South African HIV Clinicians Society. Increased awareness of the influenza vaccine and direct recommendations from healthcare providers were key factors linked to vaccine uptake.

WEB: 10.4102/sajhivmed.v27i1.1819
IMPACT FACTOR: 1.8
CITED HALF-LIFE: 5.3

START COMMENTARY

This study highlights substantial gaps in adult vaccination among people living with HIV (PLWH). Only 24.3% of participants reported receipt of at least one non-COVID-19 vaccine since their HIV diagnosis. Reported uptake was limited to four vaccine types, despite recommendations for broader immunization in this population. Awareness of recommended vaccines was low (below 20%). Although 67.2% of participants indicated willingness to receive a vaccine if recommended by a healthcare provider, only 28.0% had been advised by their doctor or nurse to get vaccinated. This suggests a possible gap between patient receptiveness and opportunities for vaccination counseling. Ensuring that clinicians are familiar with immunization guidelines for PLWH and strengthening provider-initiated recommendations could potentially improve uptake without relying exclusively on interventions to change patient attitudes. Several clinical and health literacy-related factors, including viral load and knowledge of ART medications, were associated with uptake in univariate analysis. However, only awareness of influenza vaccination and receiving a healthcare provider recommendation remained significantly associated in the multivariate analysis. Overall, integrating routine immunization assessment and recommendations into HIV care may help address vaccination gaps. However, the cross-sectional design and reliance on self-reported vaccination history limit causal interpretation and introduce the possibility of recall bias; results from a single urban, public-sector tertiary clinic may not be generalizable to other settings.

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5. ‘The Opportunity to Catch Up’: From Emergency Response to Immunization Sustainability in Cameroon.

Fotso J, Tchetchia A, Ngong F, Ngako V, Adje O.

Health Policy Plan. 2026 Oct 03.

PubMed ID: 42828770

ABSTRACT

The COVID-19 pandemic severely disrupted routine immunization globally and across Cameroon, causing a surge in ‘zero-dose’ (ZD) children and exacerbating ‘missed opportunities for vaccination’ (MOV). This necessitated accelerated recovery initiatives like the Big Catch-Up (BCU). This study explores BCU’s operationalization, implementation and sustainability in Cameroon, assessing how vertical funding interacted with national health systems to reach ZD and under immunized (UI) children. Focusing on four districts (urban, conflict-affected, isolated island, and remote rural), we triangulated data from 34 document reviews (e.g., national policies, operational plans, budget frameworks, and EPI reports), 37 key informant interviews across all health system levels, and 11 Focus Group Discussions (FGD) with 86 community stakeholders, including caregivers. Thematic analysis reveals that while BCU remained a campaign-style intervention with parallel reporting structures, its funding acted as a critical accelerator to operationalize Cameroon’s pre-existing but under-implemented 2021 National Policy and Guidelines on Catch-up Immunization. However, centralized financial control created top-down pressures that were mitigated through bottom-up co-creation during local micro-planning. Operationally, reducing MOV required a shift from passive screening to active ‘Catch and Vaccinate’ models, necessitating context-specific delivery adaptations in conflict zones and island populations. Despite these operational successes, stakeholders expressed deep concern regarding the long-term institutionalization due to an impending fiscal cliff. The system’s heavy reliance on external donor financing threatens the sustainability of Community Health Workers’ (CHW) incentives essential for demand generation. Furthermore, while the parallel IASO digital platform enabled real-time geolocation of missed children, it created double-reporting burdens, highlighting the structural challenge of synchronizing campaign tools with the national routine health information system. Ultimately, while recovery funding can successfully catalyze national policies and drive immediate equity gains, sustained resilience requires an urgent transition to domestic financing, the embedding of adaptive service delivery models into routine primary care, and the harmonization of digital tracking systems.

WEB: 10.1093/heapol/czag116

IMPACT FACTOR: 3.5

CITED HALF-LIFE: 8.3

START COMMENTARY

In response to pandemic-related disruptions to childhood immunization, the Big Catch-Up (BCU) initiative sought to recover missed vaccinations and strengthen immunization systems. This qualitative study examined its implementation in four contrasting settings in Cameroon, highlighting the interactions between external financing, national governance, and local service delivery. Findings demonstrate how external financing can accelerate the implementation of existing national immunization priorities, while also creating tensions between centrally defined targets and decentralized planning. The authors highlight the importance of balancing national coordination with locally adapted approaches that reflect community needs and implementation contexts. They also identified the value of more proactive vaccine delivery approaches to minimize missed opportunities for vaccination related to multi-dose vial opening rules. In some settings, locally adapted service delivery strategies were necessary to address community mistrust of a state-sponsored campaign, vaccine hesitancy, and geographic barriers to access. Importantly, the study raises questions about the sustainability of catch-up efforts as external funding declines. Maintaining progress will require not only greater domestic financing but also continued investment in community-level delivery and locally responsive immunization strategies. Future efforts should assess the costs of locally adapted outreach and establish sustainable domestic financing.

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6. Small quantity lipid-based nutritional supplementation and measles vaccination coverage in children aged 6-23 months: a pragmatic cluster-randomized trial.

Cazes C, Goni B, Gabillard D, Owolabi O, Yapi B, Nabunje J, et al.

Nat Med. 2026 Oct 02;32(10):3622-3632.
PubMed ID: 42827131

ABSTRACT

Undernutrition and infectious diseases pose a double threat to child survival, especially in areas with a high malnutrition burden and low vaccination coverage. In this study, we evaluated whether distributing preventive small-quantity lipid-based nutrient supplements (SQ-LNS) alongside routine immunization services may increase vaccine uptake in a pediatric, pragmatic, cluster-randomized controlled trial in northern Nigeria. Twenty geographically defined clusters across two Local Government Areas were randomized 1:1 to the NutriVax strategy (intervention) or standard National Program of Immunization (NPI) services (control). NutriVax provided a monthly ration of SQ-LNS to children aged 6-23 months after routine NPI delivery at primary healthcare centers. The primary outcome was coverage of the first dose of measles-containing vaccine (MCV1) verified by vaccination card among children aged 12-23 months, assessed in an endline population-based household cross-sectional survey 12 months after conducting a similar baseline survey. The endline survey included 1,604 children (801 control, 803 NutriVax); 48% of children surveyed in intervention clusters had ever received SQ-LNS. The odds of receiving card-verified MCV1 were two times higher in the NutriVax arm than in the control arm (odds ratio = 2.08, 95% confidence interval (CI): 1.30-3.35, P = 0.004). The difference-in-differences, cluster conditional analysis indicated a 20.1 percentage-point (pp) increase in MCV1 coverage from baseline (95% CI: 13.7-26.5 pp, P < 0.0001) relative to the control arm. Co-delivering SQ-LNS with routine immunization substantially improved card-verified MCV1 uptake, supporting a scalable strategy to make progress toward targets set by the World Health Organization's Immunization Agenda 2030 in similar settings. ClinicalTrials.gov identifier: NCT06387511 .

WEB: 10.1038/s41591-026-04675-1
IMPACT FACTOR: 52.3
CITED HALF-LIFE: 6.3

START COMMENTARY

Authors of a pragmatic, cluster-randomized controlled trial found that adding a monthly ration of NutriVax, a small-quantity lipid-based nutritional supplementation (SQ-LNS), improved first-dose

measles-containing vaccine (MCV1) administration among children aged 12-23 months in Nigeria. In the NutriVax arm, MCV1 coverage increased from 25.0% at baseline to 55.3% at endline, compared to an increase from 29.9% to 41.2% in the control arm. The odds of receiving MCV1 were 2.08 times higher in the NutriVax arm than in the control arm (95% confidence interval (CI) 1.30–3.35, p-value = 0.004). The authors also reported a 17.0-percentage-point reduction in zero-dose prevalence and a 9.9-percentage-point increase in full vaccination. Children in the NutriVax arm had higher odds of timely MCV1 receipt and receiving MCV2, pentavalent 3, yellow fever, and meningitis vaccines.

Reported barriers to full vaccination in both arms included maternal workload, family problems including maternal illness, distance to vaccination sites, long wait times, and inconvenient vaccination hours. The pragmatic study design strengthens the external validity and policy relevance of the findings. However, the study was conducted only in Nigeria, potentially limiting generalizability to other regions. Implementation of the NutriVax arm also included additional support to ensure availability of SQ-LNS and prevent vaccine stockouts, which may not be feasible in all settings. The authors plan to conduct further analyses of factors influencing intervention implementation and cost-effectiveness.

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7. Impact of digital health interventions in improving pediatric immunization coverage and timeliness in low- and middle-income countries: a systematic review and meta-analysis.

Samante F, Tiu V, Cansino E, Jose R, Capistrano M, Aliño P, et al.

Vaccine. 2026 Oct 13;93:129176.
PubMed ID: 42826688

ABSTRACT

INTRODUCTION: Vaccine-preventable diseases disproportionately affect children in low- and middle-income countries (LMICs), where barriers to vaccine demand and access limit coverage. Digital health interventions have been increasingly implemented to address these gaps; however, evidence regarding their effectiveness remains heterogeneous. This systematic review and meta-analysis evaluated the impact of digital interventions on pediatric vaccination outcomes in LMICs.

METHODS: We systematically searched Scopus, PubMed, Cochrane Library, CINAHL, ClinicalTrials.gov, Ovid MEDLINE, and EMBASE, and screened the reference list of relevant studies. Randomized controlled trials evaluating the effect of digital interventions on pediatric vaccinations in LMICs were included. Statistical analyses computed pooled outcomes, heterogeneity, and subgroup effects. The complete protocol was registered in PROSPERO (CRD:420251101655).

RESULTS: Twenty-two studies involving 68,664 participants met the inclusion criteria. Meta-analysis of pooled data showed that digital interventions delivered via reminder-only (RR 1.273; 95% CI 1.086-1.492; I2 = 93.3%), education (RR 1.953; 95% CI 1.076-3.542; I2 = 62.3%), and reminder with education (RR = 1.721; 95% CI 1.377-2.152; I2 = 0%) strategies improved immunization coverage of target vaccines as compared with usual care. Digital reminders were more effective in urban (RR 1.141; 95% CI 1.079-1.207; I2 = 51.5%) than in rural (RR 1.050; 95% CI 0.994-1.109; I2 = 0%) settings. Digital interventions also improved the timely receipt of pentavalent vaccines (RR 1.547; 95% CI 1.104-2.167; I2 = 95.4%). Among studies assessing acceptability, caregivers perceived digital interventions as beneficial, with a pooled prevalence of 94.7% (95% CI 0.765-0.990; I2 = 96.5%).

CONCLUSION: Integration of digital technologies into immunization programs enhances vaccination coverage and timeliness, supporting their wider adoption as effective and well-accepted tools for improving immunization outcomes.

WEB: 10.1016/j.vaccine.2026.129176
IMPACT FACTOR: 3.4
CITED HALF-LIFE: 8.4

START COMMENTARY

This systematic review and meta-analysis of 22 studies published between 2015 and 2025 including 68,664 participants evaluated the impact of digital interventions on pediatric vaccination outcomes in low- and middle-income countries (LMICs). The authors found that reminder-only, education-only, and combined reminder and education interventions improved vaccination coverage compared with usual care. The magnitude of effects for digital reminder interventions was greater in urban versus rural settings, potentially reflecting differences in literacy and structural barriers to vaccination. Digital interventions also improved the timely receipt of pentavalent vaccines, suggesting that these strategies may help caregivers adhere to vaccination schedules. Retention of children across doses suggested that digital interventions may be an important tool for reducing dropouts. In addition, digital strategies were well received by caregivers. Among studies assessing caregiver acceptability, a pooled estimate indicated that 94.7% of caregivers perceived digital interventions as beneficial. Strengths of this study include broad geographic representation and inclusion of multiple digital intervention strategies. However, heterogeneity across studies, including differences in intervention content and implementation, limits the generalizability of pooled findings. Future work could explore cost-effectiveness and scalability of digital interventions as well as considering adaptations tailored to target communities.

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8. Effectiveness of timely hepatitis B birth dose vaccination to prevent mother-to-child transmission in Ethiopia.

Berhe N, Desalegn H, Mengistu H, Birhane D, Kebede B, Maru M, et al.

Clin Infect Dis. 2026 Sep 24.
PubMed ID: 42781776

ABSTRACT

BACKGROUND: Mother-to-child transmission (MTCT) is an important route of new hepatitis B virus (HBV) infections. In Africa, limited and conflicting data on the effectiveness of hepatitis B birth dose vaccination (HepB-BD) have contributed to fragmented adoption and sub-optimal implementation. We aimed to assess the effectiveness of timely HepB-BD in preventing HBV MTCT in Ethiopia.

METHODS: We conducted a multi-centre cross-sectional observational study in Ethiopia from May 2022 to June 2024. We identified mothers who had tested positive for hepatitis B surface antigen (HBsAg) during pregnancy and assessed mother-infant pairs at 6-12 months post-partum for HBV MTCT. We stratified effectiveness of HepB-BD by maternal risk profile (HBV DNA level, hepatitis B e-antigen (HBeAg) status).

RESULTS: The analysis included 387 children born to HBV-positive, HIV-negative mothers who had completed routine HBV vaccination (HepB3). The median age of infant testing was 10 months (IQR 7.0-11). Overall MTCT risk was 5.2% (95% CI 3.4,7.8). MTCT was significantly lower among infants receiving HepB-BD alone (0/39, 0% [95% CI 0-9.0]) compared to those without immunoprophylaxis at birth (20/131, 15.3% [95% CI 10.1-22.4]) (p = 0.009). No transmission occurred with HepB-BD plus HBIg (0/217, 0% [95% CI 0-1.7]). Maternal viral load >200,000 IU/ml (AOR 16.6, 95% CI 4.82,57.19) and HBeAg positivity (AOR 4.21, 95% CI 1.08,16.44) were associated with increased MTCT risk amongst infants without immunoprophylaxis at birth.

CONCLUSIONS: In Ethiopia, the current vaccination series starting at 6 weeks is insufficient to prevent HBV MTCT. Timely HepB-BD is highly effective in reducing HBV MTCT and should be prioritised for scale-up in Africa.

WEB: 10.1093/cid/ciag598
IMPACT FACTOR: 8.4
CITED HALF-LIFE: 8.3

START COMMENTARY

This multicenter study from Ethiopia provides evidence supporting timely hepatitis B birth-dose (HepB-BD) vaccination as a strategy to prevent mother-to-child transmission (MTCT). Among 387 children who were born to HBV-positive mothers and completed the standard HepB3 schedule, 20/387 (5.2%) tested positive for HBsAg at 6-12 months. All 20 infections occurred among infants who received no immunoprophylaxis at birth (20/131; 15.3%), compared with no observed transmissions among infants receiving HepB-BD, with or without hepatitis B immunoglobulin (HBIG). While the authors note that the absolute reduction in observed transmission risk was particularly large among infants born to mothers with high HBV viral loads, the sample size in this subgroup analysis was small, and the results should be interpreted cautiously. Among infants receiving no immunoprophylaxis at birth, higher maternal HBV DNA levels and HBeAg positivity were also independently associated with transmission, although both were measured postpartum.

These findings provide evidence supporting the ongoing national scale-up of universal HepB-BD in Ethiopia. However, the relatively small HepB-BD-only group and greater use of HBIG than anticipated limit conclusions about the effectiveness of vaccination alone. Exclusion of mothers receiving antiviral prophylaxis and the higher proportion of facility-based births than is typical in Ethiopia may also affect generalizability. Overall, the findings strengthen the case for timely HepB-BD as an important component of Ethiopia's HBV prevention strategy, alongside maternal screening and antiviral prophylaxis.

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9. Vaccination coverage among migrant and refugee populations in Uganda: A narrative review of challenges and recommendations.

Nakachwa S, Okorobe P, Onama J.

Glob Public Health. 2026 Sep 23;21(1):2735676.
PubMed ID: 42776600

ABSTRACT

Uganda hosts one of Africa's largest refugee populations, yet displaced and migrant communities face persistent barriers to routine immunisation. Despite commitments to vaccine equity, many remain unprotected against preventable diseases. This narrative review synthesises evidence from peer-reviewed studies, national surveys, and institutional reports up to September 2025 to assess immunisation coverage, challenges, and potential solutions among refugees and migrants in Uganda. The findings indicate that vaccination rates in refugee communities are generally lower than national averages due to administrative barriers, vaccine shortages, long distances to health facilities, language difficulties, misinformation, and challenges intensified during the COVID-19 pandemic. Economic hardship further limits healthcare access. However, several strategies show promise: integrating refugees into national immunisation systems, simplifying registration processes, strengthening mobile outreach, engaging community health workers, and improving cross-border data coordination. Addressing these inequities requires both technical and social commitment through adequate financing, inclusive policies, and meaningful community engagement. Achieving equitable immunisation for refugees in Uganda is essential for public health protection and the realisation of universal health coverage.

WEB: 10.1080/17441692.2026.2735676
IMPACT FACTOR: 2.6
CITED HALF-LIFE: 5.6

START COMMENTARY

Refugee and migrant populations often face disproportionate barriers to routine immunization, despite vaccination being essential to protecting both displaced communities and their hosts. This narrative review synthesizes evidence through September 2025 on vaccination coverage and barriers to immunization among these populations in Uganda. Despite relatively inclusive refugee health policies, administrative obstacles, discriminatory practices, and health system constraints can

prevent refugees from accessing routine services. Vaccine stockouts and fragmented delivery pathways may further disrupt vaccination schedules. Notably, available evidence suggests that while routine coverage is often inconsistent, high uptake can occur during outbreaks and mass campaigns, highlighting the challenge of sustaining access beyond short-term vaccination efforts.

The authors advocate for approaches to better accommodate displaced populations, including removing administrative barriers, expanding outreach beyond fixed health facilities, and engaging refugee communities through trusted, multilingual communication. Strengthening coordination between health services and improving vaccination records are also important for maintaining continuity of care among mobile populations. A key strength of this review is its broad consideration of structural, health system, and community-level determinants. However, the underlying evidence is heterogeneous and limited, making it difficult to establish the magnitude of coverage gaps or fully characterize barriers across refugee and migrant populations. As a narrative review drawing on evidence from different settings, some approaches also require further consideration in Uganda. Ultimately, the review highlights that translating inclusive refugee policies into equitable immunization access will likely depend on sustained investment in national health systems, reliable service delivery, and meaningful engagement with displaced communities.

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10. Predicting zero-dose vaccination status in 27 sub-Saharan African countries: a machine learning approach.

Endehabtu B, Addisu Taye E.

BMJ Health Care Inform. 2026 Sep 18;33(1).
PubMed ID: 42759970

ABSTRACT

OBJECTIVE: To develop a machine learning (ML)-based predictive model for assessing the risk of zero-dose children using Demographic Health Survey data in sub-Saharan Africa.

METHODS: This study analysed pooled Demographic and Health Survey data from 27 countries in sub-Saharan Africa collected between 2016 and 2024. Data preprocessing included imputation, balancing of unequal classes and systematic feature selection. Seven ML models were trained and evaluated using performance metrics such as accuracy, recall and F1-score. Feature importance was interpreted using SHapley Additive exPlanations (SHAP)-based analysis.

RESULTS: Among the seven models evaluated, LightGBM demonstrated the best overall performance, achieving the highest accuracy (80%), sensitivity (91%), and area under the receiver operating characteristic curve (AUROC = 0.78). SHAP analysis identified place of delivery, antenatal care attendance, maternal tetanus vaccination, household wealth and maternal education as top predictors.

DISCUSSION: Our findings suggest that machine learning, particularly LightGBM and XGBoost, is moderately effective in predicting the risk of zero-dose vaccination among children. This approach facilitates the easy identification of children most at risk of missing life-saving vaccinations.

CONCLUSION: The LightGBM model predict children at zero-dose risk, enabling early identification and supporting intervention strategies. Future studies will scale these models using larger, routine datasets for practical implementation.

WEB: 10.1136/bmjhci-2026-102188
IMPACT FACTOR: 6.2
CITED HALF-LIFE: 3.4

START COMMENTARY

Identifying zero-dose children remains an important challenge in achieving equitable immunization coverage. This study explored the use of machine learning (ML) to improve early identification of

children at risk of remaining unvaccinated. Using data from 18,959 children aged 12-23 months across 27 sub-Saharan African countries, the authors compared seven ML algorithms, with LightGBM demonstrating the strongest predictive performance. LightGBM achieved approximately 80% accuracy, correctly classifying most children, and 91% sensitivity. However, its ability to distinguish between vaccinated and zero-dose children was more moderate (area under the receiver operating characteristic curve [AUROC] = 0.78). Place of delivery, antenatal care attendance, maternal tetanus vaccination, and socioeconomic factors emerged as important predictors. These findings reinforce the connection between maternal healthcare access and childhood immunization, suggesting that opportunities to identify at-risk children may exist before their first vaccination is due.

However, several limitations warrant consideration. Reliance in part on caregiver-reported vaccination may introduce misclassification. Pooling data across countries may obscure important contextual differences, and factors such as vaccine hesitancy and health system disruptions were not captured. Although model performance was promising, its moderate discrimination and lack of external validation highlight the need for further evaluation. Before integrating ML-based risk prediction into routine maternal and postnatal care, external validation and country-specific adaptation are needed to establish whether these models can reliably identify at-risk children and support targeted follow-up. Implementation should also consider how to reach children at greatest risk of being zero-dose who may have limited contact with the healthcare services through which these models would operate.

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11. Enablers and barriers to implementing a digital logistics system: A qualitative evaluation of OpenLMIS for Nigeria's vaccine supply chain.

Noiki I, Aladesanmi L, Gupta S, Mechael P, Layer E, Agarwal S, et al.

PLOS Glob Public Health. 2026 Sep 15;6(9):e0005581.
PubMed ID: 42743171

ABSTRACT

Logistics management information systems (LMIS) strengthen health commodity distribution and decision-making. Nigeria introduced OpenLMIS, an electronic LMIS, in August 2021 to track COVID-19 vaccines, and a routine immunisation (RI) module was deployed nationwide in 2023. This evaluation examined enablers and barriers to effective implementation and sustained use. A qualitative design combined desk reviews of LMIS documents, 42 key informants interviews, and 16 structured observational assessments with Cold Chain Officers. Data collection occurred in three states, the Federal Capital Territory, Lagos, and Niger, and nine Local Government Areas (LGA; three per state), which were purposively selected to capture diverse operational contexts. OpenLMIS has been rolled out across all 835 Nigerian cold stores at the zonal, state, and LGA levels. Adoption was driven by strong government stewardship (through policy prioritisation, allocation of personnel, and facilitation of site access), particularly the National Primary Health Care Development Agency (NPHCDA), and consistent financial and technical support from partners, including Gavi, the Vaccine Alliance, the Clinton Health Access Initiative (CHAI), and UNICEF. Persisting challenges include high staff turnover disrupting continuity; limited user training, often online-only, and insufficient where connectivity is poor; unreliable power and internet are hindering timely data entry and access; and inadequate, unsustained funding for data bundles, which shifts costs to users and undermines utilisation and data quality. OpenLMIS is advancing digitisation and visibility of Nigeria's immunisation supply chain for informed decision-making. However, qualitative evidence from national stakeholders and the 3 sampled, states indicate that to maximise its benefits, stakeholders should address individual-level disincentives (e.g., turnover, training gaps), invest in reliable power and connectivity, and ensure sustainable financing for data and system operations alongside continued improvement in functionality.

WEB: 10.1371/journal.pgph.0005581
IMPACT FACTOR: 2.8
CITED HALF-LIFE: 2.5

START COMMENTARY

This study highlights challenges of implementing digital systems within vaccine supply chains. Following its nationwide rollout across 835 cold stores, OpenLMIS was perceived to improve vaccine stock visibility, accountability, and supply chain management. State Program Managers reported that the system streamlined logistics processes, reduced paperwork, and enhanced transparency through improved stock tracking, while also shifting staff responsibilities towards data management and analysis. They further highlighted that access to real-time information on vaccine stock levels, distribution, and utilization supported more informed decision-making by frontline workers and senior management. However, sustained utilization remains constrained by high staff turnover, inadequate training, unreliable internet and electricity, and insufficient government funding for operational costs. Notably, the requirement for parallel paper-based and electronic reporting at lower administrative levels adds to staff workload and risks undermining the efficiencies that digitalization aims to achieve. A key strength of this study is the triangulation of 42 stakeholder interviews with 16 observational assessments and document reviews, providing insight into both perceived experiences and practical system use. However, the lack of analysis of quantitative OpenLMIS utilization and reporting data limits assessments of system performance and impact. Overall, the findings emphasize that successful digitalization requires not only technological investment but also sustained government ownership, workforce capacity-building, and reliable infrastructure.
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Additional Articles of Interest

12 Timeliness of childhood vaccination in Iran: Survival analysis of a national immunization survey, 2019. {Full Article}

13 Determinants of Age-Appropriate Childhood Immunization Uptake: A Cross-Sectional Study of Caregiver, Child, Knowledge, Access, and Attitudinal Factors. {Full Article}

14 Methodological drivers, reporting completeness, and transferability in HPV vaccination economic evaluations: A scoping review. {Full Article}

15 Exploring the broader social value outcomes reported in economic evaluations of vaccination programmes across the life course: A scoping review. {Full Article}

16 Cognitive and behavioral determinants of HPV vaccination willingness and Behavior among female university students in Karnataka, India. {Full Article}

17 Impact and cost-effectiveness of national implementation of rotavirus vaccination in Vietnam: A modeling study. {Full Article}

18 Determinants of childhood vaccination differ between conflict-affected and non-conflict regions in Cameroon. {Full Article}

19 Correlates of reported rotavirus vaccination among young Indonesian children: a cross-sectional analysis of the Indonesia Family Life Survey (IFLS-5). {Full Article}

20 Assessing the impact of routine malaria vaccination on total disease burden in Cameroon: a nationwide difference-in-differences analysis using health district surveillance data (2023-2025). {Full Article}

21 Immunization timeliness and its determinants among young children in Baghdad, Iraq: A cross-sectional study using documented vaccination cards. {Full Article}

22 Caregiver knowledge and Attitudes toward Human Papillomavirus Vaccination among adolescent girls living with HIV in Sierra Leone: A health facility-based cross-sectional study. {Full Article}

23 Using Immunization Data Systems to Track Zero-Dose Children in Bangladesh: Mixed Methods Exploratory Study. {Full Article}

24 Accelerated discovery of thermostable mRNA-lipid nanoparticle vaccines using data-efficient AI. {Full Article}

25 Beyond disease prevention: rotavirus vaccine rollout and child stunting in Tanzania. {Full Article}

26 Rebuilding Vaccine Confidence Through Community-Centered Health Promotion: A Call for Trust, Engagement, and Sustainable Immunization. {Full Article}

27 Financing of Human Papillomavirus Vaccination in Africa: A Scoping Review. {Full Article}

28 Oral vaccine delivery systems: Gastrointestinal barriers, gut microbiota, and emerging engineering strategies. {Full Article}

29 Timeliness of measles vaccination in selected districts of Oromia Region, Ethiopia - 2021. {Full Article}

30 Cost-effectiveness and budget impact analyses of strategies to improve measles vaccination coverage in Kenya. {Full Article}

31 Global policy determinants of national human papillomavirus vaccine introductions in 2006-2025. {Full Article}

32 Optimal control of dengue under vaccine heterogeneity: From dynamical analysis to dynamic strategy optimization. {Full Article}

33 Perceived influence of media campaigns and immunization awareness in rural Muzaffarabad, Azad Jammu and Kashmir: A cross-sectional evaluation of selection Bias in digital survey methodology. {Full Article}

Appendix

The literature search for the November 2026 Vaccine Delivery Research Digest was conducted on October 24, 2026. We searched English language articles indexed by the US National Library of Medicine and published between September 15, 2026 and October 14, 2026. The search resulted in 540 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 2026/09/15:2026/10/14[Date - Publication]