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- Explored drivers of under-immunization and vaccine hesitancy among migrant and refugee populations in urban, rural, and humanitarian settings

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Details of Articles

1. [Using new cold chain technologies to extend the vaccine cold chain in India: Equipment performance, acceptability, systems fit, and costs.](#)

Kumar S, Mvundura M, Ray A, Haldar P, Lennon P, Muller N, et al.

Vaccine X. 2023 Sep 23;15:100385.

PubMed ID: 37736536

ABSTRACT

This study evaluated the performance, acceptability, costs, and systems fit of three new cold chain devices in India: a second-generation ice-lined refrigerator (ILR), a solar direct drive (SDD) refrigerator, and a long-term passive device (LTPD). The evaluation was conducted over 15 months during 2016-2017. Sites were selected for their diversity in climate, terrain, and grid electrical supply, and 31 cold chain devices were deployed, 1 to each site. Results showed that all three technologies maintained correct temperatures. The SDD refrigerators had no malfunctions, whilst the ILRs had at least one malfunction, mostly due to the printed circuit board's sensitivity to the erratic power supply. The LTPD temperature display panel caused challenges initially that required replacement of all solar panels with lithium batteries. Yet the devices' long holdovers helped ensure vaccine potency. One challenge, particularly with the ILRs and SDD refrigerators, was condensation. The passively cooled LTPD was valued in settings with smaller populations and unreliable or no power; however, some its features, including the need to condition ice blocks, made it challenging to operate. In addition, the acceptable temperature range for the LTPD, as for all passively cooled devices (greater than 0 °C and less than + 10 °C), was confusing for some health workers due to the decades-long emphasis on maintaining temperatures at + 2 °C to + 8 °C. The greatest system-related benefit was establishment of new cold chain points (CCPs) at locations with intermittent or no grid electricity, bringing immunisation services closer to hard-to-reach areas. A key limitation of all three devices was the inability to freeze ice packs, which are required for vaccine carriers, somewhat restricting the potential of these technologies to reach underserved populations. Moreover, establishing new CCPs added costs to the health system. Results from this study, including costing data, can help guide decision-making.

WEB: [10.1016/j.jvacx.2023.100385](https://doi.org/10.1016/j.jvacx.2023.100385)

IMPACT FACTOR: 3.8

CITED HALF-LIFE: 1.9

START COMMENTARY

This pilot study of three cold chain technology devices assessed equipment performance, acceptability, cost, and systems fit in order to understand issues of long holdover periods for vaccine storage and enable the establishment of new cold chain points (CCPs) in India. The CCP network has not kept up with population growth, and safe storage of vaccines at remote locations is challenging given unreliable and limited access to electricity supply. All three devices were acceptable by cold chain handlers who tested them in the field, as they found them to be easy to use and reliable. A comparison of the three cold chain technology devices that rates the devices according to key criteria, including cost factors, training requirements, and ability to maintain correct vaccine storage temperature, is found in Table 8. This detailed chart can be used by decisionmakers to identify the best option for their circumstances.

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2. [A scoping review on integrated health campaigns for immunization in low and middle income countries.](#)

Ahmed S, Haider S, Hanif S, Anwar H, Mehjabeen S, Closser S, et al.

Health Policy Plan. 2023 Sep 12.

PubMed ID: 37699072

ABSTRACT

Health campaign integration is a key implementation strategy outlined by the World Health Organization to achieve universal health coverage. This scoping review synthesizes the evidence on Integrated Health Campaigns (IHC) in the field of immunization in Low and Middle-Income Countries (LMICs) regarding the most common strategies, facilitators, and barriers. Four reviewers followed a systematic approach to identify, screen, and analyze relevant articles. The team used three search engines (PubMed, Scopus, and Google Scholar) to identify peer-reviewed journal articles as well as select institutional websites for grey literature publications. Full-text articles using any study design and across any time frame were included. Data were extracted following a predefined matrix, analyzed deductively, and presented in a narrative synthesis. Thirty (30) articles (20 academic, and 10 grey) were included in the final review. All studies included identified IHCs as effective when planning or implementation is integrated. The common strategies were: using resources efficiently in remote locations; using national immunization days to maximize impact; targeting specific age groups by selecting intervention sites that are frequented by that age group; building community ownership over the integrated program; and integrating programs that already share common elements. The key facilitators were: closing the gap between services and communities; planning, coordination, and resource management both before and during integration; cost-effectiveness; and utilization of pre-existing infrastructure. The common barriers included seemingly optimized initial cost to appear feasible only in the short term and additional responsibilities on the field staff. This review finds IHCs a common practice in immunization and identifies gaps in evidence on evaluation; indicating the need for additional research. Strong evidence accounts IHCs to increase coverage, improve community acceptance of health services, and strengthen the community models of health service delivery.

WEB: [10.1093/heapol/czad082](https://doi.org/10.1093/heapol/czad082)

IMPACT FACTOR: 3.2

CITED HALF-LIFE: 7.0

START COMMENTARY

This review by Ahmed, *et al.*, found Integrated Health Campaigns (IHCs), defined as integration of another immunization or health campaign into an existing health/immunization campaign, were an

effective strategy to increase vaccination coverage. Table 3 provides a summary of the included articles with methodology and summary of the findings. Examples of the impact of IHCs on immunization in low and middle-income countries (LMICs) are provided throughout the summary of findings. One strategy highlighted was pairing services that are widely accepted with services that have low acceptance. As an example, pairing MNCH services with the less-accepted child polio vaccination program in areas of Pakistan led to an 8.5% increase in coverage and uptake of oral polio vaccine. A key gap identified was lack of scientific research on the many government IHC programs that have been implemented.

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3. [Hepatitis B eradication: vaccine as a key player.](#)

Pujol F, Toyé R, Loureiro C, Jaspe R, Chemin I.

Am J Transl Res. 2023 Sep 13;15(8):4971-4983.

PubMed ID: 37692960

ABSTRACT

OBJECTIVE: Despite the availability of a highly effective and safe vaccine against hepatitis B virus (HBV) infection for 40 years, still almost 300 million persons are estimated to be chronically infected by this virus worldwide. The World Health Organization (WHO) has proposed a plan for hepatitis elimination by 2030. However, several factors, such as the reduction and limitation in vaccination campaigns or vaccine hesitancy (VH) in some regions of the World, might have played a role in limiting the worldwide coverage of hepatitis B prophylaxis. This review aims to describe which factors, such as VH, may be hampering the WHO 2030 goal for hepatitis B eradication.

METHODS: The review describes the development and characteristics of the HBV vaccine, from the first plasma-derived to the recombinant one. Eventual limitations in its effectiveness and particularly VH were reviewed.

RESULTS: The apparent pitfalls of the HBV vaccine, such as long-term effectiveness, vaccine-escape mutants, and adverse effects, were proven not to be a concern for this vaccine. However, VH persists and was even intensified by the COVID-19 pandemic.

CONCLUSIONS: Many barriers still exist, such as vaccine availability, lack of awareness of the benefits of HBV vaccination, and VH. HBV VH seems to be eventually overcome in many settings with active education campaigns and information, stressing the importance of developing these strategies to achieve the 2030 goal of the WHO.

WEB: [/37692960/](#)

IMPACT FACTOR: 2.2

CITED HALF-LIFE: 3.7

START COMMENTARY

Pujol, *et al.*, assessed global trends in hepatitis B prevalence as indicated by HBsAG presence. Global hepatitis B prevalence reduced by 32% between 1990 and 2019, and 68 of 194 countries had reduced all-age HBV-related death rate to ≤ 4 per 100,000, which is the 2030 target proposed in the World Health Organization Interim Guidance. However, the authors note global disparities, with prevalence being up to 6 times higher in low-income than high-income countries. In addition, there is low birth dose coverage in almost all regions of the world. As infants who acquire the disease at birth

have greatly increased odds of developing chronic hepatitis B, vaccinating at birth in countries with high prevalence is vital to decrease burden of disease.

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4. [Barriers to optimal AEFI surveillance and documentation in Nigeria: Findings from a qualitative survey.](#)

Omoleke S, Bamidele M, de Kiev L.

PLOS Glob Public Health. 2023 Sep 12;3(9):e0001658.

PubMed ID: 37682847

ABSTRACT

Effective spontaneous AEFI reporting is the first step to ensuring vaccine safety. Half of the global population lives in countries with weak vaccine safety monitoring systems, especially in the African, Eastern Mediterranean, and Western Pacific regions. Further, Immunisation services have been upscaled without commensurate effective AEFI surveillance systems. Hence, this study aims to comprehensively investigate the impediments to an effective AEFI surveillance system. Given the programmatic and regulatory implications, understanding these impediments would facilitate the development and implementation of policies and strategies to strengthen the AEFI surveillance system in Nigeria. A qualitative research design (using a grounded theory approach) was employed by conducting ten key informant interviews and two Focus Group Discussion sessions among the study population to identify the barriers impeding optimal AEFI surveillance and documentation in Nigeria. This study found that the AEFI surveillance system is in place in Nigeria. However, its functionality is sub-optimal, and the potential capacity is yet to be fully harnessed due to health systems and socio-ecological impediments. The identified impediments are human-resource-related issues- knowledge gaps; limited training; lack of designated officers for AEFI; excessive workload; poor supportive supervision and attitudinal issues; caregiver's factor; governance and leadership- moribund AEFI committee; lack of quality supervisory visit and oversight and weak implementation of AEFI policy guidance. Others include funding and logistics issues- no dedicated budget provision and weak referral mechanism; insecurity; socio-economic and infrastructural deficits- poverty, geographical barriers, limited ICT skills, and infrastructure; and poor feedback and weak community engagement by the health workers. Findings from this study provide empirical evidence and serve as an advocacy tool for vaccine pharmacovigilance strengthening in Nigeria. Addressing the impediments requires health system strengthening and a whole-of-the-society approach to improve vaccine safety surveillance, restore public confidence and promote vaccine demand, strengthen PHC services, and contribute to attaining UHC and SDGs.

WEB: [10.1371/journal.pgph.0001658](https://doi.org/10.1371/journal.pgph.0001658)

IMPACT FACTOR: 3.3

CITED HALF-LIFE: 4.2

START COMMENTARY

This well-designed qualitative study of factors impeding the reporting of adverse events following immunization (AEFI) in northwestern Nigeria identified themes through in-depth interviews with senior officers at the State and National Levels and focus group discussions with local government area officers. These focus groups specifically included both officers with good and poor performance on routine data completeness for AEFI to understand issues local officers face. Author recommendations to address identified issues are included in the conclusion section and include training and supportive supervision, prioritization of and investment in AEFI surveillance by both government and pharma, increased public laboratory capacity at the sub-national level, developing simpler options for timely reporting of AEFI such as use of an app, and addressing socio-ecological factors including education, access to health services, and infrastructure improvements.

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5. [Progress Toward Measles Elimination - African Region, 2017-2021.](#)

Masresha B, Hatcher C, Lebo E, Tanifum P, Bwaka A, Minta A, et al.

MMWR Morb Mortal Wkly Rep. 2023 Sep 26;72(36):985-991.

PubMed ID: 37676836

ABSTRACT

Worldwide, measles remains a major cause of disease and death; the highest incidence is in the World Health Organization African Region (AFR). In 2011, the 46 AFR member states established a goal of regional measles elimination by 2020; this report describes progress during 2017-2021. Regional coverage with a first dose of measles-containing vaccine (MCV) decreased from 70% in 2017 to 68% in 2021, and the number of countries with $\geq 95\%$ coverage decreased from six (13%) to two (4%). The number of countries providing a second MCV dose increased from 27 (57%) to 38 (81%), and second-dose coverage increased from 25% to 41%. Approximately 341 million persons were vaccinated in supplementary immunization activities, and an estimated 4.5 million deaths were averted by vaccination. However, the number of countries meeting measles surveillance performance indicators declined from 26 (62%) to nine (22%). Measles incidence increased from 69.2 per 1 million population in 2017 to 81.9 in 2021. The number of estimated annual measles cases and deaths increased 22% and 8%, respectively. By December 2021, no country in AFR had received verification of measles elimination. To achieve a renewed regional goal of measles elimination in at least 80% of countries by 2030, intensified efforts are needed to recover and surpass levels of surveillance performance and coverage with 2 MCV doses achieved before the COVID-19 pandemic.

WEB: [10.15585/mmwr.mm7236a3](https://doi.org/10.15585/mmwr.mm7236a3)

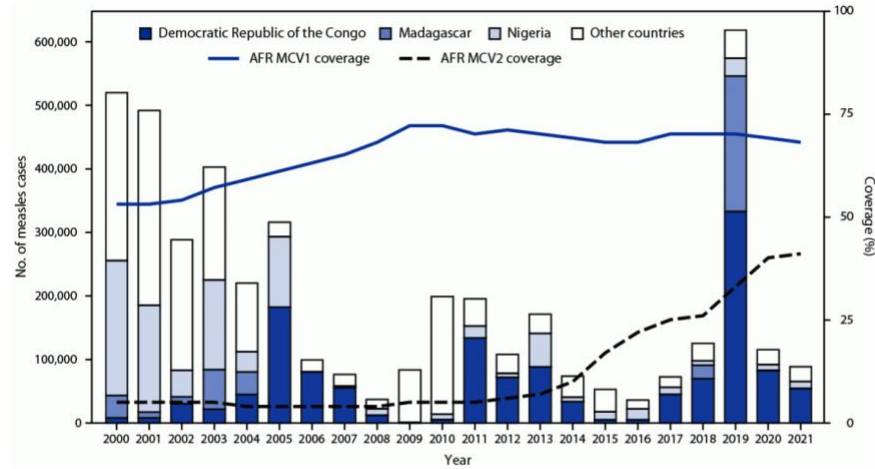
IMPACT FACTOR: 33.9

CITED HALF-LIFE: 2.7

START COMMENTARY

In this article, Masresha, *et al.*, report that 12.3 million eligible children in AFR did not receive a measles-containing vaccine (MCV1) in 2021, and an additional 21.1 million children missed the second dose (MCV2). This highlights the need for improved routine vaccine delivery programs and supplementary immunization activities (SIAs) to reach unvaccinated and under-vaccinated children in this region. Figure one shows the number of confirmed measles cases and change in coverage for MCV1 and MCV2 in AFR from 2000-2021.

FIGURE 1. Estimated coverage with the first and second doses of measles-containing vaccine* and the number of confirmed measles cases[†] — World Health Organization African Region, 2000–2021



Abbreviations: AFR = African Region; MCV1 = first dose of measles-containing vaccine; MCV2 = second dose of measles-containing vaccine; WHO = World Health Organization.

* Data from WHO and UNICEF estimates, 2021 revision (as of May 2023). <http://immunizationdata.who.int> (Accessed May 1, 2023).

[†] The number of measles cases reported via the Joint Reporting Form submitted to WHO and UNICEF by member states (as of May 2023). <https://immunizationdata.who.int/pages/incidence/measles.html> (Accessed May 1, 2023).

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6. [Drivers of early childhood vaccination success in Nepal, Senegal, and Zambia: a multiple case study analysis using the Consolidated Framework for Implementation Research.](#)

Escoffery C, Ogutu E, Sakas Z, Hester K, Ellis A, Rodriguez K, et al.

Implement Sci Commun. 2023 Sep 07;4(1):109.

PubMed ID: 37667374

ABSTRACT

INTRODUCTION: The fundamental components of a vaccine delivery system are well-documented, but robust evidence is needed on how the related processes and implementation strategies - including the facilitators and barriers - contribute to improvements in childhood vaccination coverage. The purpose of this study was to identify critical facilitators and barriers to the implementation of common interventions across three countries that have dramatically increased coverage of early childhood vaccination over the past 20 years, and to qualify common or divergent themes in their success.

METHODS: We conducted 278 key informant interviews and focus group discussions with public health leaders at the regional, district, and local levels and community members in Nepal, Senegal, and Zambia to identify intervention activities and the facilitators and barriers to implementation. We used thematic analysis grounded in the Consolidated Framework for Implementation Research (CFIR) constructs of inner and outer settings to identify immunization program key facilitators and barriers.

RESULTS: We found that the common facilitators to program implementation across the countries were the CFIR inner setting constructs of (1) networks and communications, (2) goals and feedback, (3) relative priority, and (4) readiness for implementation and outer setting constructs of (5) cosmopolitanism and (6) external policies and mandates. The common barriers were incentives and rewards, available resources, access to knowledge and information, and patients' needs and resources. Critical to the success of these national immunization programs were prioritization and codification of health as a human right, clear chain of command and shared ownership of immunization, communication of program goals and feedback, offering of incentives at multiple levels, training of staff central to vaccination education, the provision of resources to support the program, key partnerships and guidance on implementation and adoption of vaccination policies.

CONCLUSION: Adequate organizational commitment, resources, communication, training, and partnerships were the most critical facilitators for these countries to improve childhood vaccination.

WEB: [10.1186/s43058-023-00489-1](https://doi.org/10.1186/s43058-023-00489-1)

IMPACT FACTOR: 7.2

CITED HALF-LIFE: 8.1

START COMMENTARY

This qualitative study by Escoffrey, *et al.*, includes data from 278 key informant interviews and focus group discussions conducted between August 2019 and April 2021 in Nepal, Senegal, and Zambia. Overall, 21 policies and interventions were identified through key informant interviews, 18 of which were common to all three countries. These included introduction of new vaccines and media engagement on the national level, training community health workers and cold chain expansion at the subnational level, and outreach services and school outreach at the community level. The use of the Consolidated Framework for Implementation Research is a strength of this study as it provided a conceptual framework to guide the systematic assessment of facilitators and barriers to program implementation. A list of identified facilitators and barriers to program implementation can be found in Table 4.

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7. [Factors associated with full vaccination and zero vaccine dose in children aged 12-59 months in 6 health districts of Cameroon.](#)

Yakum M, Atanga F, Ajong A, Eba Ze L, Shah Z.

BMC Public Health. 2023 Sep 04;23(1):1693.

PubMed ID: 37658309

ABSTRACT

BACKGROUND: Routine immunisation coverage in Cameroon is still below the target of the national Expanded Programme on Immunisation (EPI), with only 42% of children fully immunised according to Demographic and Health Survey (DHS) report in 2018. The objective of this study was to evaluate factors associated with full immunisation and zero-dose in Cameroonian children.

METHODS: A two-stage cross-sectional cluster survey was conducted in Yaoundé in November 2021, targeting children aged 12-59 months. The clusters were chosen with probability proportionate to population size (PPS), and households selected by restricted sampling technique. Data were collected from the vaccination card of the child or from parents' recall, if the card was not available, using electronic forms with tablets. Using R (version 4.1.0.), the proportion of fully immunised children was calculated. The household wealth index was described using principal component analysis, and factors associated with full immunisation assessed with multiple logistics regression. The threshold of statistical significance was set at 5%.

FINDINGS: A total, 273 children aged 12-59 months enrolled; 37% of participants were fully immunised, and 16% had never received any vaccine. Mother's level of education: Primary (OR = 3.59, $p = 0.0200$), high school (OR = 3.68, $p = 0.0400^*$), and higher education (OR = 8.25, $p = 0.0018$), and sharing household with biological father (OR = 2.11, $p = 0.0305$) were significantly associated with full vaccination. Living in a richer (3rd-5th wealth quintiles) household (OR = 0.25, $p = 0.0053$); mother's education: Primary (OR = 0.07, $p = 0.0271$) and Higher education (OR = 0.10, $p = 0.0419$), living with the mother (OR = 0.05, $p = < 0.0001$) and living with the father (OR = 0.22, $p = 0.0253$) had significant negative association with zero-dose in children.

CONCLUSION: The proportion of fully vaccinated children in Yaounde is lower than the national average. Children from poor homes and those borne by uneducated mother have higher odds of not being vaccinated. Immunisation programmes in Yaounde need to be stepped up to improve coverage. Equally, there is a need to reconsider how the poor can the better reached with immunisation services.

WEB: [10.1186/s12889-023-16609-4](https://doi.org/10.1186/s12889-023-16609-4)

IMPACT FACTOR: 4.5

CITED HALF-LIFE: 5.5

START COMMENTARY

This study of children in six urban districts in Yaoundé, Cameroon, investigates demographic factors of caregivers and children associated with full immunization or no immunization among children aged 12-59 months. Yakum, *et al.*, reported vaccination coverage in Yaoundé is below the national target for all except BCG vaccine in children younger than 2 years old. Factors evaluated (Table 2) include child's sex and age, mother's education level, age, marital status, and employment status, father's education level, age, and employment status, household wealth index level, and relationship of child to guardian (parent, grandparent, etc.). More than 83% of vaccination data collected relied on caregiver recall, which authors speculate may have contributed to under-reporting of vaccination.

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8. [Vaccine microarray patch self-administration: An innovative approach to improve pandemic and routine vaccination rates.](#)

Hacker E, Baker B, Lake T, Ross C, Cox M, Davies C, et al.

Vaccine. 2023 Sep 25;41(41):5925-5930.

PubMed ID: 37643926

ABSTRACT

The high-density microprojection array patch (HD-MAP) is a novel vaccine delivery system with potential for self-administered vaccination. HD-MAPs provide an alternative to needle and syringe (N&S) vaccination. Additional advantages could include reduced cold-chain requirements, reduced vaccine dose, reduced vaccine wastage, an alternative for needle phobic patients and elimination of needlestick injuries. The drivers and potential benefits of vaccination by self-administering HD-MAPs are high patient acceptance and preference, higher vaccination rates, speed of roll-out, cost-savings, and reduced sharps and environmental waste. The HD-MAP presents a unique approach in pandemic preparedness and routine vaccination of adults. It could alleviate strain on the healthcare workforce and allows vaccine administration by minimally-trained workers, guardian or subjects themselves. Self-vaccination using HD-MAPs could occur in vaccination hubs with supervision, at home after purchasing at the pharmacy, or direct distribution to in-home settings. As a result, it has the potential to increase vaccine coverage and expand the reach of vaccines, while also reducing labor costs associated with vaccination. Key challenges remain around shifting the paradigm from medical professionals administering vaccines using N&S to a future of self-administration using HD-MAPs. Greater awareness of HD-MAP technology and improving our understanding of the implementation processes required for adopting this technology, are critical factors underpinning HD-MAP uptake by the public.

WEB: [10.1016/j.vaccine.2023.08.027](https://doi.org/10.1016/j.vaccine.2023.08.027)

IMPACT FACTOR: 5.5

CITED HALF-LIFE: 7.2

START COMMENTARY

In addition to the advantages included in the abstract above, this overview of microarray patch vaccines by Hacker, *et al.*, includes a discussion of key challenges to self-administration of vaccines using this delivery method. These include adverse reactions to vaccines that require immediate medical response such as anaphylaxis, methods of reporting vaccine self-administration that are rigorous enough to protect patient privacy while also verifying patient identity, and regulatory and policy requirements for vaccine delivery. To mitigate these concerns, the authors suggest use of vaccination hubs where a single healthcare worker could monitor many individuals who are self-

administering vaccines at any given time, telehealth visits during which individuals could self-administer vaccines with supervision, and apps that verify correct usage.

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9. [Evaluating Country Performance After Transitioning From Gavi Assistance: An Applied Synthetic Control Analysis.](#)

Kolesar R, Spruk R, Tsheten T.

Glob Health Sci Pract. 2023 Aug 31;11(4).

PubMed ID: 37640489

ABSTRACT

INTRODUCTION: Over the past decade, international development assistance for health has slowed. As donors seek to increase domestic cofinancing and ultimately transition countries from donor aid dependence, COVID-19 has severely constrained public budgets. The evaluation of sustainability and longer-term impacts of donor withdrawal is increasingly important. We assess vaccination coverage and post-neonatal mortality to estimate country performance of these outcomes among countries that no longer received assistance from Gavi, the Vaccine Alliance (Gavi) between 2000 and 2018.

METHODS: Using data from all countries receiving Gavi support between 2000 and 2020, we employed a synthetic control method to generate a pre-transition counterfactual with the same characteristics as the observation of interest to predict a future that empirically never existed. The synthetic unit is constructed from the weighted average of other units with good fit to the unit of interest before transition but did not transition.

RESULTS: We found substantial heterogeneity after transitioning from Gavi assistance. China, Guyana, and Turkmenistan overperformed their expected coverage rates; Albania, Bhutan, China, Guyana, and Turkmenistan maintained coverage over 90%; and Bosnia and Herzegovina and Ukraine reported precipitous drop-offs that fell well below their synthetic controls. We also observed a vaccination coverage decline in 2020 for several countries after transitioning and most synthetic controls, which we attribute to COVID-19-related service disruptions.

CONCLUSIONS: We recommend that Gavi adjust its transition model to systematically assess contextual externalities and risk. In addition, countries that no longer receive Gavi assistance can leverage technical assistance and communities of practice to mutually assist each other and other countries advancing toward transition. This could also foster intracountry accountability after transition. We also recommend that Gavi systematize post-transition assessments and evaluations that leverage the expertise and experience of graduated countries to encourage cross-learning.

WEB: [10.9745/GHSP-D-22-00536](https://doi.org/10.9745/GHSP-D-22-00536)

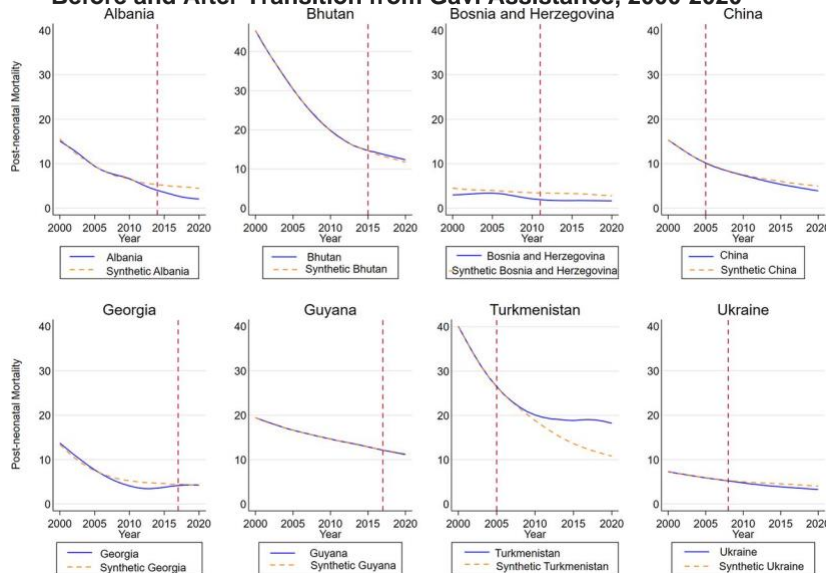
IMPACT FACTOR: 4.0

CITED HALF-LIFE: 4.5

START COMMENTARY

This study by Kolestar, et al., is based on the eight countries that transitioned from Gavi assistance to self-financing, defined as receiving less than \$100,000(USD) in Gavi support, between 2000 and 2018; countries included were Albania, Bhutan, Bosnia and Herzegovina, China, Georgia, Guyana, Turkmenistan, and Ukraine. Outcomes of interest, with data sourced from the World Health Organization, were third dose of diphtheria, tetanus toxoid, and pertussis (DTP3) coverage among 1-year old children, first dose measles vaccine coverage among 1-year old children, and post-neonatal mortality. Most countries maintained or improved key outcomes when compared to their synthetic controls, which can be seen most clearly in the post-natal mortality rates shown in Figure 5 below. The authors note that unstable or decreasing vaccination coverage in the years prior to transition like those seen in Ukraine, Bosnia and Herzegovina, and Turkmenistan may be risk indicators and could be important considerations when assessing readiness for transition.

Figure 5. Post-Neonatal Mortality Rates and Synthetic Controls Among 8 Countries Before and After Transition from Gavi Assistance, 2000-2020



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10. [Global impact and cost-effectiveness of one-dose versus two-dose human papillomavirus vaccination schedules: a comparative modelling analysis.](#)

Prem K, Choi Y, Bénard &, Burger E, Hadley L, Laprise J, et al.

BMC Med. 2023 Aug 29;21(1):313.

PubMed ID: 37635227

ABSTRACT

BACKGROUND: To eliminate cervical cancer as a public health problem, the World Health Organization had recommended routine vaccination of adolescent girls with two doses of the human papillomavirus (HPV) vaccine before sexual initiation. However, many countries have yet to implement HPV vaccination because of financial or logistical barriers to delivering two doses outside the infant immunisation programme.

METHODS: Using three independent HPV transmission models, we estimated the long-term health benefits and cost-effectiveness of one-dose versus two-dose HPV vaccination, in 188 countries, under scenarios in which one dose of the vaccine gives either a shorter duration of full protection (20 or 30 years) or lifelong protection but lower vaccine efficacy (e.g. 80%) compared to two doses. We simulated routine vaccination with the 9-valent HPV vaccine in 10-year-old girls at 80% coverage for the years 2021-2120, with a 1-year catch-up campaign up to age 14 at 80% coverage in the first year of the programme.

RESULTS: Over the years 2021-2120, one-dose vaccination at 80% coverage was projected to avert 115.2 million (range of medians: 85.1-130.4) and 146.8 million (114.1-161.6) cervical cancers assuming one dose of the vaccine confers 20 and 30 years of protection, respectively. Should one dose of the vaccine provide lifelong protection at 80% vaccine efficacy, 147.8 million (140.6-169.7) cervical cancer cases could be prevented. If protection wanes after 20 years, 65 to 889 additional girls would need to be vaccinated with the second dose to prevent one cervical cancer, depending on the epidemiological profiles of the country. Across all income groups, the threshold cost for the second dose was low: from 1.59 (0.14-3.82) USD in low-income countries to 44.83 (3.75-85.64) USD in high-income countries, assuming one dose confers 30-year protection.

CONCLUSIONS: Results were consistent across the three independent models and suggest that one-dose vaccination has similar health benefits to a two-dose programme while simplifying vaccine delivery, reducing costs, and alleviating vaccine supply constraints. The second dose may become cost-effective if there is a shorter duration of protection from one dose, cheaper vaccine and vaccination delivery strategies, and high burden of cervical cancer.

WEB: [10.1186/s12916-023-02988-3](https://doi.org/10.1186/s12916-023-02988-3)

IMPACT FACTOR: 9.3

CITED HALF-LIFE: 5.3

START COMMENTARY

Evidence from ongoing trials and post-randomization analyses of HPV vaccine efficacy suggest that one dose of HPV vaccine provides protection for more than 10 years. In this comparative modelling study, Prem, *et al.* estimates the effect of implementing a one dose HPV schedule in scenarios vaccine coverage of 80% worldwide under three sets of assumptions: 1) protection from one dose of HPV vaccine provides 20 years of protection with full vaccine efficacy, 2) one dose provides 30 years protection with full vaccine efficacy, or 3) one dose provides lifelong protection with 80% vaccine efficacy. Figure 1 provides a clear explanation of the modelling steps used. This modeling study synthesized results from three separate dynamic HPV transmission models that have been used to inform vaccine policy: the UK Health Security Agency model set in the UK, the HPV-ADVISE model set in Uganda, Nigeria, India, Vietnam, and Canada, and the Harvard model set in the US, Uganda, El Salvador, and Nicaragua, and key strength of this study is that these dynamic models used to derive global estimates are based in multiple countries located in multiple continents with varying income levels and different HPV transmission dynamics and cervical cancer burdens.

[Return to List of Articles](#)

11. [Reasons for Being “Zero-Dose and Under-Vaccinated” among Children Aged 12-23 Months in the Democratic Republic of the Congo.](#)

Ishoso D, Mafuta E, Danovaro-Holliday M, Ngandu C, Menning L, Cikomola A, et al.

Vaccines (Basel). 2023 Aug 29;11(8).

PubMed ID: 37631938

ABSTRACT

Introduction: The Democratic Republic of the Congo (DRC) has one of the largest cohorts of un- and under-vaccinated children worldwide. This study aimed to identify and compare the main reasons for there being zero-dose (ZD) or under-vaccinated children in the DRC. (2) Methods: This is a secondary analysis derived from a province-level vaccination coverage survey conducted between November 2021 and February 2022; this survey included questions about the reasons for not receiving one or more vaccines. A zero-dose child (ZD) was a person aged 12-23 months not having received any pentavalent vaccine (diphtheria-tetanus-pertussis-Hemophilus influenzae type b (Hib)-Hepatitis B) as per card or caregiver recall and an under-vaccinated child was one who had not received the third dose of the pentavalent vaccine. The proportions of the reasons for non-vaccination were first presented using the WHO-endorsed behavioral and social drivers for vaccination (BeSD) conceptual framework and then compared across the groups of ZD and under-vaccinated children using the Rao-Scott chi-square test; analyses were conducted at province and national level, and accounting for the sample approach. (3) Results: Of the 51,054 children aged 12-23 m in the survey sample, 19,676 ZD and under-vaccinated children were included in the study. For the ZD children, reasons related to people’s thinking and feelings were cited as 64.03% and those related to social reasons as 31.13%; both proportions were higher than for under-vaccinated children (44.7% and 26.2%, respectively, $p < 0.001$). Regarding intentions to vaccinate their children, 82.15% of the parents/guardians of the ZD children said they wanted their children to receive “none” of the recommended vaccines, which was significantly higher than for the under-vaccinated children. In contrast, “practical issues” were cited for 35.60% of the ZD children, compared to 55.60% for the under-vaccinated children ($p < 0.001$). The distribution of reasons varied between provinces, e.g., 12 of the 26 provinces had a proportion of reasons for the ZD children relating to practical issues that was higher than the national level. (4) Conclusions: reasons provided for non-vaccination among the ZD children in the DRC were largely related to lack of parental/guardian motivation to have their children vaccinated, while reasons among under-vaccinated children were mostly related to practical issues. These results can help inform decision-makers to direct vaccination interventions.

WEB: [10.3390/vaccines11081370](https://doi.org/10.3390/vaccines11081370)

IMPACT FACTOR: 7.8

CITED HALF-LIFE: 1.6

START COMMENTARY

Despite declaring vaccination to be compulsory and free for all children, the Democratic Republic of the Congo has high proportions of zero-dose (~19%) and under vaccinated (~25%) children between the ages 12 -23 months old. This cross-sectional survey included caregivers of 10,765 zero-dose children and 8,911 under-vaccinated children. Among caregivers with under-vaccinated children, 50% cited organizational factors of the health facility as a reason for under-vaccination, including lack of knowledge of the vaccination schedule, lack of vaccine availability, and long wait time; these areas can be targeted for intervention. While there are clear differences between caregiver's reasons for their children receiving no dose vs. being under-vaccinated, the importance of reasons for not vaccinating or under-vaccinating children varies by province (Table 2 and Table 3) and should be considered when developing interventions.

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12. [The potential global cost-effectiveness of prospective Strep A vaccines and associated implementation efforts.](#)

Lee J, Mogasale V, Kim S, Cannon J, Giannini F, Abbas K, et al.

NPJ Vaccines. 2023 Aug 29;8(1):128.

PubMed ID: 37626118

ABSTRACT

Group A Streptococcus causes a wide range of diseases from relatively mild infections including pharyngitis to more severe illnesses such as invasive diseases and rheumatic heart disease (RHD). Our aim is to estimate the cost-effectiveness of a hypothetical Strep A vaccine on multiple disease manifestations at the global-level. Cost-effectiveness analyses were carried out by building on the potential epidemiological impact of vaccines that align with the WHO's Preferred Product Characteristics for Strep A vaccines. Maximum vaccination costs for a cost-effective vaccination strategy were estimated at the thresholds of 1XGDP per capita and health opportunity costs. The maximum cost per fully vaccinated person for Strep A vaccination to be cost-effective was \$385-\$489 in high-income countries, \$213-\$312 in upper-income countries, \$74-\$132 in lower-middle-income countries, and \$37-\$69 in low-income countries for routine vaccination at birth and 5 years of age respectively. While the threshold costs are sensitive to vaccine characteristics such as efficacy, and waning immunity, a cost-effective Strep A vaccine will lower morbidity and mortality burden in all income settings.

WEB: [10.1038/s41541-023-00718-7](https://doi.org/10.1038/s41541-023-00718-7)

IMPACT FACTOR: 9.2

CITED HALF-LIFE: 2.0

START COMMENTARY

Group A Streptococcus (Strep A) is a significant cause of death and disability, with risk of severe outcomes disproportionately borne by those living in low-income settings. No vaccine for Strep A exists, but development was prioritized by the World Health Organization in 2014. Figure 3 shows the incremental cost-effectiveness ratios for the two routine vaccination strategies, routine vaccination for infants or routine vaccination at age 5, stratified by Strep A clinical presentation. While not included in the model, authors note that an effective Strep A vaccine could lower the use of antibiotics, with an 80% effective vaccine estimated to prevent 5.4-17.1% of outpatient antibiotic prescriptions for young children in the United States. Fewer antibiotic prescriptions could have the additional benefit of lowering global risk of antimicrobial resistance.

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13. [Cost-effectiveness analysis of a maternal pneumococcal vaccine in low-income, high-burden settings such as Sierra Leone.](#)

Bilgin G, Munira S, Lokuge K, Glass K.

PLOS Glob Public Health. 2023 Aug 26;3(8):e0000915.

PubMed ID: 37619237

ABSTRACT

Maternal pneumococcal vaccines have been proposed as a method of protecting infants in the first few months of life. In this paper, we use results from a dynamic transmission model to assess the cost-effectiveness of a maternal pneumococcal polysaccharide vaccine from both healthcare and societal perspectives. We estimate the costs of delivering a maternal pneumococcal polysaccharide vaccine, the healthcare costs averted, and productivity losses avoided through the prevention of severe pneumococcal outcomes such as pneumonia and meningitis. Our model estimates that a maternal pneumococcal program would cost \$606 (2020 USD, 95% prediction interval 437 to 779) from a healthcare perspective and \$132 (95% prediction interval -1 to 265) from a societal perspective per DALY averted for one year of vaccine delivery. Hence, a maternal pneumococcal vaccine would be cost-effective from a societal perspective but not cost-effective from a healthcare perspective using Sierra Leone's GDP per capita of \$527 as a cost-effectiveness threshold. Sensitivity analysis demonstrates how the choice to discount ongoing health benefits determines whether the maternal pneumococcal vaccine was deemed cost-effective from a healthcare perspective. Without discounting, the cost per DALY averted would be \$292 (55% of Sierra Leone's GDP per capita) from a healthcare perspective. Further, the cost per DALY averted would be \$142 (27% GDP per capita) from a healthcare perspective if PPV could be procured at the same cost relative to PCV in Sierra Leone as on the PAHO reference price list. Overall, our paper demonstrates that maternal pneumococcal vaccines have the potential to be cost-effective in low-income settings; however, the likelihood of low-income countries self-financing this intervention will depend on negotiations with vaccine providers on vaccine price. Vaccine price is the largest program cost driving the cost-effectiveness of a future maternal pneumococcal vaccine.

WEB: [10.1371/journal.pgph.0000915](https://doi.org/10.1371/journal.pgph.0000915)

IMPACT FACTOR: 3.3

CITED HALF-LIFE: 4.2

START COMMENTARY

This cost effectiveness analysis of a maternal pneumococcal vaccine in Sierra Leone did not include estimates for the cost of introducing a new vaccine. However, the operational costs reported may be an overestimate as the vaccine would be added to an existing tetanus toxoid maternal vaccination

program in Sierra Leone. From a societal perspective, productivity loss due to premature mortality accounted for the majority of costs saved by a maternal pneumococcal vaccine. This study likely underestimates disease-related healthcare costs averted through maternal pneumococcal vaccine as it focuses exclusively on invasive pneumococcal disease while other pneumococcal outcomes such as otitis media are sources of high burdens of DALYs in Sub-Saharan Africa.

[Return to List of Articles](#)

14. [Perspectives on Advancing Countermeasures for Filovirus Disease: Report from a Multi-Sector Meeting.](#)

Sprecher A, Cross R, Marzi A, Martins K, Wolfe D, Montgomery J, et al.

J Infect Dis. 2023 Aug 19.

PubMed ID: 37596837

ABSTRACT

Although there are now approved treatments and vaccines for Ebola virus disease (EVD), the case fatality of EVD remains unacceptably high even when treated with the newly approved therapeutics; furthermore, these countermeasures are not expected to be effective against disease caused by other filoviruses. A meeting of subject matter experts from public health, research, and countermeasure development agencies and manufacturers was held during the 10th International Filovirus Symposium to discuss strategies to address these gaps, including how newer countermeasures could be advanced for field readiness. Several investigational therapeutics, vaccine candidates, and combination strategies were presented. In all, a common theme emerged: the greatest challenge to completing development was the implementation of well-designed clinical trials of safety and efficacy during filovirus disease outbreaks. These outbreaks are usually of short duration, providing but a brief opportunity for trials to be launched, and have too few cases to allow for full enrollment during a single outbreak, so clinical trials will necessarily need to span multiple outbreaks which may occur in a number of at-risk countries. Preparing for this will require agreed-upon common protocols for trials intended to bridge multiple outbreaks across all at-risk countries. A multi-national research consortium including, and led by, at-risk countries would be an ideal mechanism to negotiate agreement on protocol design and coordinate preparation. Discussion participants recommended a follow-up meeting be held in Africa with national public health and research agencies from at-risk countries to establish such a consortium.

WEB: [10.1093/infdis/jiad354](https://doi.org/10.1093/infdis/jiad354)

IMPACT FACTOR: 6.4

CITED HALF-LIFE: 9.5

START COMMENTARY

This is a report from a meeting of subject matter experts during the 10th International Filovirus Symposium, held in September of 2022. Filoviruses that can infect humans include Ebola, Sudan virus, Bundibugyo virus, Marburg virus, Ravn virus, and Tai Forest virus. Treatments have only been developed to treat Ebola virus, which accounts for about half of filovirus disease (FVD) outbreaks. Several vaccine candidates have been proposed to protect against FVD. However, as filovirus outbreaks are rare, occur without warning, and usually last only a few months, implementing trials in

time and at scale to provide evidence of efficacy is difficult. To effectively conduct a trial under these circumstances, all pre-trial preparation work, including Phase 1 trials and approval of protocols for treatment of infected individuals, exposed individuals, and unexposed individuals, should be completed so the trial could be launched as soon as an outbreak is detected. Of note, few stakeholders from countries where filovirus outbreaks occur were included in this meeting. Any future discussions must include representatives from those groups.

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15. [Defining drivers of under-immunization and vaccine hesitancy in refugee and migrant populations.](#)

Deal A, Crawshaw A, Carter J, Knights F, Iwami M, Darwish M, et al.

J Travel Med. 2023 Sep 07;30(5).

PubMed ID: 37335192

ABSTRACT

BACKGROUND/OBJECTIVE: Some refugee and migrant populations globally showed lower uptake of COVID-19 vaccines and are also considered to be an under-immunized group for routine vaccinations. These communities may experience a range of barriers to vaccination systems, yet there is a need to better explore drivers of under-immunization and vaccine hesitancy in these mobile groups.

METHODS: We did a global rapid review to explore drivers of under-immunization and vaccine hesitancy to define strategies to strengthen both COVID-19 and routine vaccination uptake, searching MEDLINE, Embase, Global Health PsycINFO and grey literature. Qualitative data were analysed thematically to identify drivers of under-immunization and vaccine hesitancy, and then categorized using the 'Increasing Vaccination Model'.

RESULTS: Sixty-three papers were included, reporting data on diverse population groups, including refugees, asylum seekers, labour migrants and undocumented migrants in 22 countries. Drivers of under-immunization and vaccine hesitancy pertaining to a wide range of vaccines were covered, including COVID-19 (n = 27), human papillomavirus (13), measles or Measles-mumps-rubella (MMR) (3), influenza (3), tetanus (1) and vaccination in general. We found a range of factors driving under-immunization and hesitancy in refugee and migrant groups, including unique awareness and access factors that need to be better considered in policy and service delivery. Acceptability of vaccination was often deeply rooted in social and historical context and influenced by personal risk perception.

CONCLUSIONS: These findings hold direct relevance to current efforts to ensure high levels of global coverage for a range of vaccines and to ensure that marginalized refugee and migrant populations are included in the national vaccination plans of low-, middle- and high-income countries. We found a stark lack of research from low- and middle-income and humanitarian contexts on vaccination in mobile groups. This needs to be urgently rectified if we are to design and deliver effective programmes that ensure high coverage for COVID-19 and routine vaccinations.

WEB: [10.1093/jtm/taad084](https://doi.org/10.1093/jtm/taad084)

IMPACT FACTOR: 25.7

CITED HALF-LIFE: 2.7

START COMMENTARY

This rapid scoping review included data on migrant and refugee populations in 20 countries in urban, rural, and humanitarian settings, and included reporting on a wide range of vaccines. The authors clearly defined inclusion criteria and used the WHO's Increasing Vaccination Model framework to structure results. Table 2 provides information about vaccine, population, and factors contributing to low vaccine acceptability, and includes proposed solutions, strategies, and best practices. Authors also include three case studies of successful strategies, but stress that vaccine hesitancy and under-immunization are highly context-dependent and require knowledge of the specific populations.

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Additional Articles of Interest

- 1 A Comparison of the Awareness, Attitude, and Uptake of COVID-19, Hepatitis B Virus, and Yellow Fever Vaccines Between Rural and Urban Respondents in Edo State, Nigeria. [{Full Article Link}](#)
- 2 Immunization in the Eastern Mediterranean Region: some signs of post-COVID-19 recovery, but more work ahead. [{Full Article Link}](#)
- 3 Vaccination Utilization and Subnational Inequities during the COVID-19 Pandemic: An Interrupted Time-Series Analysis of Administrative Data across 12 Low- and Middle-Income Countries. [{Full Article Link}](#)
- 4 Interventions to improve vaccine coverage of pregnant women in Aotearoa New Zealand. [{Full Article Link}](#)
- 5 Bilosomes as Nanocarriers for the Drug and Vaccine Delivery against Gastrointestinal Infections: Opportunities and Challenges. [{Full Article Link}](#)
- 6 The road towards protection of all against tetanus. [{Full Article Link}](#)
- 7 A postpartum intervention for vaccination promotion by midwives using motivational interviews reduces mothers' vaccine hesitancy, south-eastern France, 2021 to 2022: a randomised controlled trial. [{Full Article Link}](#)
- 8 Association Between Maternal Literacy and Child Immunization According to the Expanded Program on Immunization Schedule in a Primary Health Care Center of a Squatter Settlement in Karachi. [{Full Article Link}](#)
- 9 Vaccination coverage survey of children aged 1-3 years in Beijing, China, 2005-2021. [{Full Article Link}](#)
- 10 Cost-effectiveness analysis of hepatitis E vaccination strategies among patients with chronic hepatitis B in China. [{Full Article Link}](#)
- 11 Barriers and Strategies for Hepatitis B and C Elimination in Pakistan. [{Full Article Link}](#)
- 12 Changes in immunization coverage and contributing factors among children aged 12-23 months from 2000 to 2019, Ethiopia: Multivariate decomposition analysis. [{Full Article Link}](#)
- 13 Novel "GaEI Antigenic Patches" Identified by a "Reverse Epitomics" Approach to Design Multipatch Vaccines against NIPAH Infection, a Silent Threat to Global Human Health. [{Full Article Link}](#)
- 14 Urban-rural disparities in immunization coverage among children aged 12-23 months in Ethiopia: multivariate decomposition analysis. [{Full Article Link}](#)
- 15 Evaluation of vaccine rollout strategies for emerging infectious diseases: A model-based approach including protection attitudes. [{Full Article Link}](#)
- 16 RTS,S/AS01E vaccine defaults in Ghana: a qualitative exploration of the perspectives of defaulters and frontline health service providers. [{Full Article Link}](#)

- 17 Ensuring equity with pre-clinical planning for chlamydia vaccines. [{Full Article Link}](#)
- 18 The political economy of financing traditional vaccines and vitamin A supplements in six African countries. [{Full Article Link}](#)
- 19 Cost analysis of an innovative eHealth program in Nigeria: a case study of the vaccine direct delivery system. [{Full Article Link}](#)
- 20 Pertussis immunisation strategies to optimise infant pertussis control: A narrative systematic review. [{Full Article Link}](#)
- 21 Case study of a 2022 pertussis epidemic in the Baoro sub-prefecture (Central African Republic). [{Full Article Link}](#)
- 22 Compulsory Vaccination Coverage in 12 Sub-Saharan African Countries Two Years Following the COVID-19 Pandemic. [{Full Article Link}](#)
- 23 Systematic review and meta-analysis comparing educational and reminder digital interventions for promoting HPV vaccination uptake. [{Full Article Link}](#)
- 24 Mumps vaccine hesitancy: Current evidence and an evidence-based campaign in Japan. [{Full Article Link}](#)
- 25 Public Knowledge, Awareness, and Vaccination Rates for Hepatitis B in India: A Cross-Sectional Survey. [{Full Article Link}](#)
- 26 Predictors of timeliness of vaccination among children of age 12-23 months in Boricha district, Sidama region Ethiopia, in 2019. [{Full Article Link}](#)
- 27 Parental Knowledge, Attitudes, and Perceptions Impacting Willingness to Vaccinate Against the Human Papillomavirus in Trinidad. [{Full Article Link}](#)
- 28 Emerging vaccine strategies against the incessant pneumococcal disease. [{Full Article Link}](#)
- 29 Determinants of incomplete child vaccination among mothers of children aged 12-23 months in Worebabo district, Ethiopia: Unmatched case-control study. [{Full Article Link}](#)

Appendix

The literature search for the 2023 Vaccine Delivery Research Digest was conducted on October 5, 2023. We searched English language articles indexed by the US National Library of Medicine and published between August 15, 2023 and September 14, 2023. The search resulted in 504 items.

SEARCH TERMS

```
(((((vaccine[tiab] OR vaccines[tiab] OR vaccination[tiab] OR immunization[tiab] OR  
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OR electropor*[tiab] OR "systems biology"[tiab] OR "animal model"[tiab] OR cattle[tiab] OR  
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