VACCINE DELIVERY RESEARCH DIGEST

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

REPORT TO THE GATES FOUNDATION

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1 Coverage of complete basic childhood vaccination and its variation by basic characteristics among children aged 12-23 months in 41 low- and middle-income countries: A Meta-analysis of demographic and health survey reports between 2015 and 2025.

{Abstract & START Commentary} {Full Article}

- A meta-analysis of childhood vaccine coverage in low- and middle-income countries was completed using demographic and health survey reports.

2 Exploring the relationship between experience of vaccine adverse events and vaccine hesitancy: A scoping review.

{Abstract & START Commentary} {Full Article}

- This scoping review included 55 articles in an evaluation of the relationship between vaccine hesitancy and experience of vaccine adverse events.

3 Assessing the geographic and socioeconomic determinants of vaccine coverage in Ethiopia: A spatial and multistage analysis at the district level.

{Abstract & START Commentary} {Full Article}

- Factors associated with vaccine coverage in Ethiopia were identified and a prediction model of immunization coverage was developed.

4 Cholera in conflict: outbreak analysis and response lessons from Gadaref state, Sudan (2023-2024).

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- The epidemiology of a cholera outbreak in Gadaref state, Sudan was described.

5 Coverage, timeliness of measles immunisation and its predictors in Pakistan: an analysis of 6.2 million children enrolled in the Provincial Electronic Immunisation Registry.

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- Vaccination coverage at specific ages was assessed and predictors of timeliness of vaccination were examined using Cox proportional hazard regression.

6 Designing a National Rapid Vaccine Coverage Survey in low-resource settings: Experiences from the Democratic Republic of the Congo 2018-2023.

{Abstract & START Commentary} {Full Article}

- The development of the Kinshasa School of Public Health Vaccine Coverage Survey (KSPH VCS) was described.

7 Development and validation of the Oxford Benchmark Scale for Rating Vaccine Technologies (OBSRVT), a scale for assessing public attitudes to next-generation vaccine delivery technologies.

{Abstract & START Commentary} {Full Article}

- The development of a scale to gauge the acceptability of existing and future vaccine delivery technologies was described.

8 Barriers and strategies to improve vaccine adverse events reporting: views from health workers and managers in Northern Ghana.

{Abstract & START Commentary} {Full Article}

- Healthcare professionals' and managers' perspectives regarding how to improve AEFI reporting in northern Ghana were explored.

9 Dynamics of global emergency vaccine stockpiles: A systems analysis and application to cholera.

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- The role of global emergency vaccine stockpiles in achieving public health goals was explored and underlying health system structures were identified and evaluated.

10 Incidence of Pertussis in Older Children Underestimated in the Whole-Cell Vaccine Era: A Cross-Sectional Seroprevalence Study.

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- The prevalence of pertussis among school-age children during the administration of the whole-cell pertussis (wP) vaccine in China was investigated.

11 Persistent socioeconomic disparities in childhood vaccination coverage in Tanzania: Insights from multiple rounds of demographic and health surveys.

{Abstract & START Commentary} {Full Article}

- Trends, disparities, and factors associated with childhood vaccination coverage in Tanzania were evaluated using data from Tanzania Demographic and Health Surveys in 2010, 2015, 2022.

12 A qualitative process evaluation of community-based participatory research and human-centered design in the 'Let's talk about vaccines' approach in Mozambique and Malawi.

{Abstract & START Commentary} {Full Article}

- Key elements for effective use of community-based participatory research and human-centered design to identify immunization barriers and create solutions were described.

13 Immunisation health workforce capacity building in Southeast Asia: reflections from training programme implementation in Cambodia and Lao PDR.

{Abstract & START Commentary} {Full Article}

- A country-centered approach to building training programs to build workforce capacity in Cambodia and Lao PDR was described.

14 Influence of maternal risk perception and vaccination knowledge on childhood vaccination intentions.

{Abstract & START Commentary} {Full Article}

- The role of maternal knowledge, risk perception, health self-efficacy, and demographic characteristics on intent to vaccinate their newborns was explored.

Appendix

Details of Articles

1. Coverage of complete basic childhood vaccination and its variation by basic characteristics among children aged 12-23 months in 41 low- and middle-income countries: A Meta-analysis of demographic and health survey reports between 2015 and 2025.

Tamir T, Tekeba B, Techane M, Alemu T, Wubneh C, Wassie Y.

Vaccine. 2025 Mar 13;54:127019.

PubMed ID: 40081230

ABSTRACT

INTRODUCTION: Vaccination plays a crucial role in reducing illness and death associated with diseases. Children who are unvaccinated or only partially vaccinated face greater risks of illness and death. Despite the proven benefits of vaccination, coverage remains uneven, particularly in in low- and middle-income countries (LMICs), where disparities in access and uptake can lead to significant public health challenges. This meta-analysis was aimed to evaluate the coverage of complete basic childhood vaccinations (CBCVs) and its variations among children aged 12 to 23 months.

METHODS: Our meta-analysis included demographic and health survey reports published in any language that reported basic childhood vaccination among children aged 12 to 23 months between 2015 and 2025. A random-effects meta-analysis model was used to determine the pooled prevalence of vaccination. Sub-group analysis was performed by study characteristics to identify potential sources of heterogeneity among studies. Forest plots and tables were used to display the pooled estimates along with their corresponding 95 % confidence intervals (CIs).

RESULTS: The coverage of CBCV was found to be 59.0 %, with a 95 % CI of 53.1 % to 65.0 % ($I2 = 77.9$ %, $p < 0.001$). For reports published from 2015 to 2018, the vaccination coverage was 55 %, while for reports published in 2019-2024, the pooled effect size increased to 63 %. Specific vaccine coverage rates included BCG at 86 %, Pentavalent at 67 %, Polio at 69 %, and Measles at 75 %. The vaccination rates varied by maternal education, birth order, and wealth status.

CONCLUSION: The coverage of basic childhood vaccinations in LMICs remains far below the global target of 90 % or more by 2030. Significant disparities in vaccination rates were observed, particularly related to maternal education, birth order, and household wealth status. To address these challenges, improving access to vaccinations and enhancing public education about their importance are essential steps for policymakers and health practitioners.

WEB: 10.1016/j.vaccine.2025.127019
IMPACT FACTOR: 4.5
CITED HALF-LIFE: 7.9

START COMMENTARY

Coverage of complete basic childhood vaccinations (CBCV) was defined as receiving one dose of the Bacillus Calmette Guerin (BCG) vaccine, three doses of the pentavalent vaccine, three doses of a polio vaccine, and one dose of a measles-containing vaccine before 12 months of age. Coverage was lowest in Angola and Nigeria at 31%, and highest in Rwanda and Jordan at 96% and 92%, respectively (Table 1). CBCV was higher among children of mothers with higher education (68%) than among children of mothers with no formal education (45%) (Figure 6). Those in the highest wealth quintile were more likely to have been vaccinated than those in the lowest quintile, with CBCV of 66% and 47%, respectively (Figure 7).

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2. Exploring the relationship between experience of vaccine adverse events and vaccine hesitancy: A scoping review.

Gauna F, Raude J, Khouri C, Cracowski J, Ward J.

Hum Vaccin Immunother. 2025 Mar 09;21(1):2471225.

PubMed ID: 40058398

ABSTRACT

Fear of side effects is the main motive for vaccine refusal. However, before the COVID-19 pandemic, little attention had been paid to the actual experience of adverse events and its relationship with vaccine hesitancy. This scoping review aimed to analyze the impact of VH on EAE and vice versa. We reviewed 55 articles. Most of the studies focused on COVID-19 vaccination and employed cross-sectional surveys with self-reported indicators. These studies identified significant correlations between EAE and VH. Social cognitive models shed some light on the influence of EAE on VH, while the converse is usually explained by the nocebo effect that predominately accounts for the converse. This emerging research field is hampered by significant inconsistencies in theoretical explanations, assessments of the relationship, and measurements of these two phenomena. A more comprehensive consideration of individual experience, both objective and subjective, would help develop more effective vaccine communication strategies and improve pharmacological surveillance.

WEB: 10.1080/21645515.2025.2471225

IMPACT FACTOR: 4.1

CITED HALF-LIFE: 4.1

START COMMENTARY

This scoping review included studies from 27 countries reporting adverse events after vaccination and measuring vaccine hesitancy among adults; most studies (82%) focused on COVID-19 vaccines. Overall, 17 articles (31%) evaluated the association between self-reported side effects and vaccine hesitancy as a primary research objective. 10 of 18 studies that evaluated side effects and vaccine attitudes or hesitancy found experiencing side effects had a negative impact on vaccine attitudes/behaviors or intent to vaccinate.

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3. Assessing the geographic and socioeconomic determinants of vaccine coverage in Ethiopia: A spatial and multistage analysis at the district level.

Forzy T, Tesfaye L, Getnet F, Misganew A, Lamma S, Worku A, et al.

Vaccine. 2025 Mar 08;53:126834.
PubMed ID: 40056895

ABSTRACT

BACKGROUND: Despite substantial progress over the past decades, many Ethiopian children still lack the full WHO-recommended immunization schedule. Notably, diphtheria-pertussis-tetanus-Hib-HepB and measles vaccines present large coverage disparities in Ethiopia. This study integrated routine, survey and census data from health, geographic and socioeconomic sources at the district level. We then explored associations between extracted covariates and coverage of measles (1st dose, MCV1) and diphtheria-pertussis-tetanus-Hib-HepB (3rd dose, Penta3). Lastly, we developed prediction models of immunization coverage.

METHODS: We utilized multiple data sources, including district (known as woreda) immunization coverage estimates from the District Health Information Software (DHIS-2), Demographic and Health Surveys, demographic census, and public databases on electricity, administrative boundaries and health facility geolocations. We sought to develop parsimonious beta-regression models of immunization coverage using variable selection, so as to identify covariates with high predictive power. We then fitted and internally validated generalized additive models to predict MCV1 and Penta3 coverage.

RESULTS: Our analysis identified access time to health centers, electrification levels, and woreda sizes as major factors associated with district-level immunization. Our prediction models estimated district-level MCV1 and Penta3 coverage with mean absolute errors of 11-12 %.

CONCLUSIONS: This study highlights the significant potential of geospatial models for public health policy and planning in low- and middle-income countries. By integrating diverse data sources and focusing on the district level, we provide a quantitative framework for identifying gaps in immunization coverage. The approach, using geographic and socio-economic data, can be effectively applied to a wide range of public health interventions.

WEB: 10.1016/j.vaccine.2025.126834
IMPACT FACTOR: 4.5
CITED HALF-LIFE: 7.9

START COMMENTARY

Forzy et al. estimated the proportion of the population with electricity in each woreda using an existing geospatial dataset of electricity access in sub-Saharan Africa and WorldPop data. Mean time to walk to a health center at the woreda level was used to evaluate average access to health care and variance of that variable was used as a proxy for inequality in health care access. Children from woredas with a higher variance in health services access were less likely to have received the first dose of measles vaccine (MCV1) (OR: 0.87, P=0.005), and children from woredas with higher proportions of the population with electricity were more likely to have received both MCV1 (OR: 1.22, p<0.001) and the 3rd dose of pentavalent vaccine (OR: 1.17, p<0.001).

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4. Cholera in conflict: outbreak analysis and response lessons from Gadaref state, Sudan (2023-2024).

Izzoddeen A, Abualgasim H, Abasher M, Elnoor H, Magbol M, Fadlelmoula S, et al.

BMC Public Health. 2025 Mar 06;25(1):881.

PubMed ID: 40045292

ABSTRACT

BACKGROUND: Cholera is an acute, severe, illness caused by infection with Vibrio cholerae. Cholera outbreaks are closely linked to armed conflicts and humanitarian emergencies. This study describes the cholera outbreak amidst conflict in Gadaref state, discusses the possible factors mediated its spread and proposes future improvements in preparedness and response measures.

METHODS: A retrospective analytical study was conducted using national surveillance records of cholera cases, supported by interviews with key informants involved in preparedness and response, along with a review of state reports, to identify possible factors contributing to the spread and to evaluate the response.

RESULT: The outbreak was confirmed after the isolation of Vibrio cholerae of O1 serotype, with both Inaba and Ogawa serogroups. A total of 2,047 cholera cases records reviewed. The mean age was 16.8 (SD, 15.8) with an equal gender distribution. The case fatality ratio was 2.4% and the overall attack (AR) rate was 7.38 cases per 10,000 population, with the highest in Medeinat Gadaref locality (21.07/10,000). Interviews and reports review suggest that the outbreak was likely imported to villages near Ethiopian border before spreading to other parts of Gadaref. Atbara seasonal river, was the identified source of infection at the beginning. A disrupted health system due to conflict, delays in response teams' deployment, and late implementation of control measures were identified as factors contributing to response delay and expansion of the outbreak. Oral cholera vaccine campaign was implemented in five localities, followed by an observable decline in cases.

CONCLUSION: Cholera remains a recurrent risk that has been further exacerbated by the armed conflict. The reporting of index cases from a border village highlights the need to strengthen surveillance at points of entry. Investment in case management and risk communication is necessary to improve clinical outcomes. The use of Oral Cholera Vaccine was associated with a decline in cases; however, further field studies are recommended to analyze its actual contribution in limiting the outbreak. The government's primary role in leading and financing preparedness and response interventions has been limited by the conflict, urging investment in community-led interventions, while moving to more strategic outbreak preparedness and response financing mechanisms remains a priority, with partner support being essential in conflict settings.

WEB: 10.1186/s12889-025-22128-1

IMPACT FACTOR: 3.5

CITED HALF-LIFE: 5.4

START COMMENTARY

Izzoddeen et al. describe the epidemiology of a cholera outbreak in Gadaref state, Sudan, between August 2023 and January 2024. An oral cholera vaccine (OCV) campaign began ~3 months after the first cases were identified through passive surveillance. Figure 1 shows the distribution of cases by week while Figure 4 shows reported cases before and after the OCV campaign in the five localities where the campaign was implemented. While reported cases noticeably declined after the vaccine campaigns, it is unclear how much is attributable to vaccination as case numbers were gradually declining in the weeks prior to the campaign.

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5. Coverage, timeliness of measles immunisation and its predictors in Pakistan: an analysis of 6.2 million children enrolled in the Provincial Electronic Immunisation Registry.

Memon M, Siddiqi D, Dharma V, Shah M, Iftikhar S, Setayesh H, et al.

BMJ Glob Health. 2025 Mar 03;10(3).

PubMed ID: 40032518

ABSTRACT

BACKGROUND: Measles-related morbidity and mortality persists due to suboptimal and delayed vaccination, predominantly in low- and middle-income countries where more than 95% of global measles deaths occur. We evaluated the coverage, timeliness of measles vaccination and its predictors for children aged 12-23 months in Sindh, Pakistan.

METHODS: We analysed immunisation data from Sindh Province's Electronic Immunisation Registry for 6.2 million children aged 12-23 months. We assessed vaccination coverage at specific ages, calculated timeliness using Expanded Programme on Immunisation-Sindh criteria and examined predictors for timely vaccination using Cox proportional hazard regression. Spatial mapping was used to identify zero-dose measles hotspots.

RESULTS: Among 6 227 450 children aged 12-23 months, 80.6% received the first measles vaccine dose and only 58.1% of those vaccinated children aged 15-23 months received the second dose. Only 36.6% and 31.4% of children received measles-1 and 2 at the recommended age range (measles-1: 270-301 days; measles-2: 453-484 days). Subnational analysis identified 26.5% of Union Councils with ≥25% measles unvaccinated children. Children of educated mothers (≥11 years) compared with uneducated mothers had a higher timely measles vaccination likelihood (measles-1: HR=1.24; 95% CI: 1.23 to 1.26; p=0.010 and measles-2: HR=1.19; 95% CI: 1.18 to 1.21; p<0.001), while children who received the last vaccination at an outreach compared with a fixed site had a lower timely measles vaccination likelihood (measles-1: HR=0.91; 95% CI: 0.90 to 0.91; p<0.001 and measles-2: HR=0.93; 95% CI: 0.93 to 0.94; p<0.001).

CONCLUSION: Suboptimal and delayed measles vaccination coverage casts serious doubts on attaining measles elimination by 2030, as stated in the Immunisation Agenda. Continued high-level national commitment and implementation of targeted strategies are imperative to achieving global measles immunisation goals.

WEB: 10.1136/bmjgh-2024-016717

IMPACT FACTOR: 7.1

CITED HALF-LIFE: 3.2

START COMMENTARY

Children living in remote rural areas were more likely to have received both doses of measles-containing vaccines (MCVs) than those in urban areas, with MCV1 coverage of 90% and 75% and MCV2 coverage of 71% and 51%, respectively. Among those living in urban areas, coverage was lower in areas of high poverty, defined as urban slums by Sindh's Expanded Programme on Immunization (Sindh-EPI), with coverage in urban slums vs urban non-slums of 69% and 78% for MCV1, and 44% and 54% for MCV2, respectively. Caregivers who received SMS reminders a day before their child was due for an MCV dose were more likely to have a child who was vaccinated within the recommended timeframe, with a 7% higher likelihood of timely receipt of MCV1 and 6% higher likelihood for MCV2. (Table 4).

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6. Designing a National Rapid Vaccine Coverage Survey in low-resource settings: Experiences from the Democratic Republic of the Congo 2018-2023.

Mafuta E, Lulebo A, Kasonga J, Mvuama N, Luhata C, Hoff N, et al.

Vaccine. 2025 Mar 03;53:126956.

PubMed ID: 40031089

ABSTRACT

In the Democratic Republic of the Congo (DRC), estimating vaccine coverage (VC) has traditionally relied on large-scale surveys such as the Demographic and Health Surveys (DHS) and the Multiple Indicator Cluster Surveys (MICS). However, these surveys are infrequent, costly, and lack the granularity needed for decision-making at the health district or zone (HZ) level. This paper describes the development by the Kinshasa School of Public Health (KSPH), and technical partners of a Vaccine Coverage Survey (KSPH VCS), adapted from the World Health Organization (WHO) guidelines, which aims to provides timely, cost-effective, and representative estimates of VC at the HZ level. The KSPH VCS adopted a cross-sectional design and a multi-stage sampling approach to sample households at the HZ level. It uses Health Area as cluster in spite of Enumeration Area, and extends the eligibility age range from 12 -23 months to 6-23 months. The sample size for each HZ was calculated using vaccine coverage provided in MICS-2018. It integrates assessments of barriers and enablers to vaccination. Since 2023, it has included malaria indicators. Since its inception in 2018, it has expanded nationwide, covering all 26 provinces of the DRC by 2022. Findings from the KSPH VCS provides estimates at the HZ level that could be combined to provincial and national estimates. Results have been instrumental in evaluating national immunization strategies, including the Mashako Plan and informing Presidential Forums on immunization. They have informed resource allocation, operational planning, and policy decisions at both national and provincial levels as they provided granularity needed for operational decision-making at the HZ level. Its results have also contributed to global immunization estimates, including the WHO/UNICEF Estimates of National Immunization Coverage (WUENIC). The KSPH VCS demonstrates the feasibility of a locally led, cost-effective, and adaptable VC survey in a low-resource setting. Its success highlights the potential for similar methodologies to be implemented in other low- and middle-income countries seeking to improve immunization monitoring and health system performance.

WEB: 10.1016/j.vaccine.2025.126956

IMPACT FACTOR: 4.5

CITED HALF-LIFE: 7.9

START COMMENTARY

The Kinshasa School of Public Health Vaccine Coverage Survey (KSPH VCS) was adapted from World Health Organization survey guidelines to provide annual vaccine coverage information for the Democratic Republic of the Congo. Methodology adaptations and sampling strategies are found in Table 1 and Figure 2. Time from initial planning of the annual survey to preliminary result dissemination has been less than 6 months on average, providing timely evidence for vaccine policy decisions and program implementation at the national and provincial level (Figure 4).

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7. Development and validation of the Oxford Benchmark Scale for Rating Vaccine Technologies (OBSRVT), a scale for assessing public attitudes to next-generation vaccine delivery technologies.

Kantor J, Carlisle R, Vanderslott S, Pollard A, Morrison M.

Hum Vaccin Immunother. 2025 Mar 03;21(1):2469994.

PubMed ID: 40028861

ABSTRACT

Next-generation vaccine delivery technologies may provide significant gains from both a technical and behavioral standpoint, but no scale has yet been developed to assess public attitudes to novel vaccine delivery technologies. We therefore performed a cross-sectional validation study that included 1,001 demographically representative participants from the UK and US to develop and validate a novel scale, the Oxford Benchmark Scale for Rating Vaccine Technologies (OBSRVT). A sample of 500 UK participants was used to perform exploratory factor analysis with categorical variables (using a polychoric correlation matrix) followed by promax oblique factor rotation to develop the initial model. This yielded a 15-item 4-domain scale with domains including acceptance (6 items), effectiveness (4 items), comfort (3 items), and convenience (2 items). This model was tested for robustness on a 501-participant demographically representative sample from the US. A confirmatory factor analysis with a Satorra-Bentler scaled test statistic was performed, which demonstrated adequate goodness of fit statistics including the root mean squared error of approximation (0.057), standardized root mean squared residual (0.053), and comparative fit index (0.938). Reliability as internal consistency was excellent (alpha = 0.92). Convergent validity with the Oxford Needle Experience Scale was supported by an adequate correlation ($r = 0.31$, $p < .0001$), while discriminant validity was supported by a lack of correlation with an unrelated question ($r = -0.03$, $p < .0001$). These findings suggest that the OBSRVT scale represents a feasible, valid, and reliable scale that could be used to gauge the acceptability of existing and future vaccine delivery technologies, and further investigation and testing should be considered.

WEB: 10.1080/21645515.2025.2469994

IMPACT FACTOR: 4.1

CITED HALF-LIFE: 4.1

START COMMENTARY

The 15 item Oxford Benchmark Scale for Rating Vaccine Technologies (OBSVRT) scale is found in Table 2. It is scored using a 5-point Likert scale from “Much less than with a needle and syringe” to “Much more than with a needle and syringe” and items include “I would prefer this vaccine delivery method” and “I trust that this vaccine delivery method will provide immunity” to compare new

technology to traditional vaccine administration. The four domains included in the final scale were acceptance, effectiveness, confidence, and concerns. Future studies should be conducted to determine validity beyond UK and US populations.

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8. Barriers and strategies to improve vaccine adverse events reporting: views from health workers and managers in Northern Ghana.

Ansah N, Weibel D, Chatio S, Oladokun S, Duah E, Ansah P, et al.

BMJ Public Health. 2025 Mar 01;3(1):e001464.
PubMed ID: 40017916

ABSTRACT

BACKGROUND: The increasing incidence of novel vaccine-preventable diseases, such as COVID-19, has led to an increase in the development of vaccines globally. Vaccine hesitancy has risen due to fears of vaccines causing harm. African health systems have generally relied on spontaneous reporting of adverse events following immunisation (AEFIs) to monitor vaccine safety.

OBJECTIVES: This study explored the views of healthcare professionals and managers regarding barriers and strategies to improve AEFI reporting in northern Ghana.

METHODS: This study used a qualitative research design where in-depth interviews were conducted with health professionals and managers in five administrative regions in northern Ghana between March and August 2021. The purposive sampling method was used to select districts and participants. The interviews were audio recorded, transcribed, and coded into themes using QSR NVivo V.12 software before thematic content analysis.

RESULTS: The study found that lack of feedback is the main regulatory-level factor affecting reporting adverse events. Health system-level factors, such as limited knowledge of reporting AEFIs, a lack of training, difficulties in using electronic application software to complete AEFI forms, and fear of punishment, significantly affect AEFI reporting. At the patient/community level, the main factors affecting AEFI reporting are the distance to health facilities and transportation costs. However, participants suggested continuous AEFI education, sensitisation of health workers and patients, timely feedback, and effective stakeholder collaboration among front-line health workers, health managers, and the national pharmacovigilance authority could improve AEFI reporting in Ghana.

CONCLUSIONS: Reporting of AEFIs contributes to improving vaccine safety, surveillance systems and prompt case management. However, the study identified multiple key factors at the regulatory, health system, and patient levels affecting AEFI reporting. Thus, improvements in line with these suggestions, including effective stakeholder engagement, are necessary to increase AEFI reporting.

WEB: 10.1136/bmjph-2024-001464
IMPACT FACTOR: 7.1
CITED HALF-LIFE: 3.2

START COMMENTARY

Some front-line workers directly involved in immunization activities reported that they were not trained in how to report adverse events following immunization (AEFIs), identify AEFIs, or counsel patients about the need to report AEFIs. They indicated that they were given no feedback when they filed reports, so they did not know if their reports were received or accurately recorded. Those interviewed suggested that timely feedback would ensure correct and consistent filing of AEFI reports. Additionally, they felt that counseling caregivers about what should be reported would increase AEFI reports as individuals may hesitate to report events that they think are not significant enough to warrant a visit to the health facility.

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9. Dynamics of global emergency vaccine stockpiles: A systems analysis and application to cholera.

Guttieres D, Van Riet C, Vandaele N, Decouttere C.

Vaccine. 2025 Apr 07;52:126889.

PubMed ID: 40014984

ABSTRACT

BACKGROUND: The frequency and magnitude of infectious disease outbreaks are expected to rise. Although emergency vaccine stockpiles have emerged as a strategy to hedge against sporadic demand and accelerate response efforts, their long-term management is complex.

OBJECTIVE: This study investigates the role of global emergency vaccine stockpiles in achieving public health goals over time and underlying health system structures that drive their performance, with an application to cholera.

METHODS: A qualitative study design was used, combining insights from literature and semi-structured interviews with experts engaged in stockpile-related activities. A systems analysis, using qualitative causal loop diagrams, helps explain global stockpile behavior and discuss leverage points for change. It includes identifying system elements, important relationship between them, and resulting feedback loops.

FINDINGS: Despite expanding the stockpile for oral cholera vaccines, growing supply shortages since 2021 can partly be explained by increased demand due to a surge in outbreaks and the accumulation of evidence on vaccine effectiveness. These supply constraints have led to delays fulfilling vaccine orders for reactive campaigns and a pause on preventive use, leaving populations vulnerable. Despite ongoing efforts to scale-up production, a continued challenge is designing effective risk-sharing policies to attract manufacturers given uncertainty in demand forecasts and erratic orders. In literature, the time-dependent and complex environmental, social, demographic, and structural drivers that underpin the emergence and spread of disease are rarely jointly considered, making it difficult to anticipate the changing role and use of stockpiles relative to other preparedness strategies. Over time, global emergency vaccine stockpiles can support the transition from reactive to proactive strategies, helping achieve evolving public health goals towards disease elimination.

CONCLUSIONS: As disease epidemiology, vaccination strategies, uptake, and supply markets evolve asynchronously, there is a need for decision-support tools that better integrate supply and demand dynamics, hence expanding traditionally narrow model boundaries.

WEB: 10.1016/j.vaccine.2025.126889

IMPACT FACTOR: 4.5

CITED HALF-LIFE: 7.9

START COMMENTARY

This study identified 48 studies identified through a scoping review, annual reports by the International Coordination Group on Vaccine Provision (ICG), and 8 semi-structured interviews with stakeholders engaged in vaccine stockpile activities; studies were used to create qualitative causal loop diagrams (CLDs) to explain stockpile behavior and its role in cholera disease management. CLDs indicate how variables within a system are expected to interact, providing a visual representation of how changes in one variable impacts others throughout the system. Figure 2 provides a CLD showing dynamics of replenishment and deployment for vaccine stockpiles.

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10. Incidence of Pertussis in Older Children Underestimated in the Whole-Cell Vaccine Era: A Cross-Sectional Seroprevalence Study.

Du Q, Meng Q, Shi W, Yao K.

Vaccines (Basel). 2025 Feb 28;13(2).
PubMed ID: 40006747

ABSTRACT

OBJECTIVES: China was once a country with a high incidence of pertussis, with reported incidence rates exceeding 100 per 100,000 before the introduction of the pertussis vaccine. After the widespread implementation of the pertussis vaccination program, reported cases of pertussis significantly decreased. This study aimed to investigate the serological prevalence of pertussis among school-age children during the administration of the whole-cell pertussis (wP) vaccine in China.

METHODS: We selected a representative random sample from different schools, with the inclusion criteria being school-age children without clinical symptoms of pertussis. A total of 368 frozen serum samples were obtained from children aged 6-<18 years at various schools in Guizhou in November 2005 and subsequently analyzed.

RESULTS: The positive rate of anti-pertussis toxin (PT) IgG antibodies (>62.5 IU/mL) were 4.9% (16/368) among school-age children. The positive rates of anti-PT IgG antibodies were 3.3%, 3.8%, 4.0%, 3.3%, and 10.8% in children aged 6-<8 y, 8-<10 y, 10-<12 y, 12-<14 y, and 14-<18 y, respectively. The increase in PT-IgG antibody levels among older children was likely due to pertussis infection in these school-age children. The positive rate of anti-PT IgG varied between different schools. The pertussis antibody levels of adolescents aged 14-<18 y were significantly higher than those of school-age children in the younger age group (6-<8 y and 8-<10 y) ($p = 0.0097$ and $p = 0.0007$, respectively).

CONCLUSIONS: During the era of wP vaccine use, pertussis infections were common among school-age children, particularly in adolescents, with potential unrecognized localized or school-based outbreaks.

WEB: 10.3390/vaccines13020200
IMPACT FACTOR: 5.2
CITED HALF-LIFE: 2.2

START COMMENTARY

Reported cases of pertussis are rare among school-age children and adolescents in China. The pattern of higher proportions of positive anti-pertussis toxin (PT) IgG antibodies with higher age among school-age children identified in the serum samples studied suggests that pertussis transmission occurred without being detected by public health authorities or healthcare providers. As the positive rate of anti-PT IgG varied by school, it is likely that there were local outbreaks that were not detected.

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11. Persistent socioeconomic disparities in childhood vaccination coverage in Tanzania: Insights from multiple rounds of demographic and health surveys.

Bendera A, Nakamura K, Tran X, Kapologwe N, Bendera E, Mahamba D, et al.

Vaccine. 2025 Apr 08;52:126904.

PubMed ID: 39999540

ABSTRACT

OBJECTIVES: This study examined the trends, disparities, and factors associated with childhood vaccination coverage in Tanzania between 2010 and 2022.

METHODS: We used data from three recent Tanzania Demographic and Health Surveys. We included a total of 5637 children aged 12-23 months and their mothers. Socioeconomic disparities in childhood vaccination coverage were evaluated using concentration curves and indices, and decomposition analysis was performed to identify the contributing factors. Poisson regression analysis was conducted to determine the factors associated with childhood vaccination uptake in Tanzania.

RESULTS: Full vaccination coverage remained stable at approximately 75.6 % from 2010 to 2015 but declined to 70.5 % by 2022. Throughout all three survey rounds, children from households with a lower socioeconomic position consistently had lower full vaccination coverage than those from families with a higher socioeconomic position. The concentration index for full vaccination coverage was 0.1531 in 2010 ($p < 0.001$), 0.1466 in 2015 ($p < 0.001$), and 0.1314 in 2022 ($p < 0.001$), indicating persistent but slightly decreasing inequality favoring upper-class children (F-stat = 3.27, $p = 0.038$). The key contributors to these inequalities were maternal illiteracy, poverty, and lack of exposure to mass media. Factors that increased childhood vaccination uptake included higher socioeconomic position, facility-based childbirth, antenatal care utilization, proximity to healthcare facilities, and having fewer children under the age of five in the household.

CONCLUSION: Despite Tanzania's considerable overall childhood vaccination coverage, the findings indicated significant socioeconomic disparities. Urgent action is needed to close these gaps and ensure that every child in Tanzania receives life-saving protection regardless of their background or circumstances.

WEB: 10.1016/j.vaccine.2025.126904

IMPACT FACTOR: 4.5

CITED HALF-LIFE: 7.9

START COMMENTARY

Figure 1 shows the proportion of vaccinated children aged 12-23 months in Tanzania in 2010, 2015, and 2022. Between 2015 and 2022, BCG and polio vaccine coverage declined by 5% and 8%, respectively, measles vaccine and diphtheria, pertussis, and tetanus (DPT) vaccine coverage increased by ~1% each, and the proportion of children fully vaccinated declined from 76% to 71%. Children from the poorest households were consistently less likely to be fully vaccinated (Figure 2).

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12. A qualitative process evaluation of community-based participatory research and human-centered design in the 'Let's talk about vaccines' approach in Mozambique and Malawi.

Shuro L, Lawrence E, De Man J, Knight L, Schneider H, Tabana H.

Res Involv Engagem. 2025 Feb 26;11(1):11.

PubMed ID: 39985101

ABSTRACT

BACKGROUND: Ensuring full coverage of childhood vaccination programmes is a persistent challenge in low- and middle-income countries. Urgent action is required to ensure catch up of missed immunisations in children, while simultaneously building trust and demand within communities to sustainably address existing immunization gaps. This paper summarizes the findings of a process evaluation of the 'Let's talk about vaccines' approach by VillageReach in Mozambique and Malawi. The approach used community-based participatory research to identify the barriers to childhood vaccination faced by caregivers and healthcare workers, with human-centered design to codesign potential interventions to improve under two immunization access and uptake.

METHODS: To evaluate the implementation of the 'Let's talk about vaccines' approach we conducted a qualitative process evaluation guided by the Reach Effectiveness Adoption Implementation Maintenance framework and Consolidated Framework for Implementation Research (CFIR). We completed a total of 76 qualitative interviews and 85 self-administered surveys among caregivers, healthcare workers, health officials and other stakeholders involved in the approach. We transcribed the interviews verbatim and analysed them using thematic analysis and constructs of the RE-AIM and CFIR frameworks. We analysed the survey results in Excel.

RESULTS: Key elements of the approach contributing to high fidelity to community-based participatory research principles in both countries, included diverse collaborative study and project teams, involvement of eight caregiver researchers, novel and traditional participatory methods, and extensive mobilization efforts. Success factors for human-centered design in the ideation and prototyping phase included fostering equal participation and empathy, value placed on each participant's input, mitigating inherent power differences, interactive feedback processes, and extensive iterative processes leading to tangible solutions. Challenges included adjusting to new methods and contextual realities. Factors influencing the potential adoption of the approach included locally developed solutions, participant involvement, collaboration, a major advantage over alternative approaches, ease of use of the co-created interventions, alignment with government objectives, and adaptability for system-wide integration into immunization programming. The potential sustainability of the approach was supported by the involvement of health ministries, health professionals, community representatives, and capacity building of local structures. However,

resource and incentive constraints posed as a potential challenge to maintaining long-term motivation and action.

CONCLUSION: The evaluation findings from the 'Let's talk about vaccines' approach highlighted key elements for applying community-based participatory research and human-centered design to collaboratively identify immunization barriers and create tangible solutions to overcome them. By integrating these approaches into routine immunization programs, it can potentially improve vaccination efforts for children under two in low and middle-income countries, leading to lasting change. Supporting policies that prioritize community involvement in research, program design and implementation and sustainable funding enhances immunization strategies, ensuring that they are tailored to local needs.

WEB: 10.1186/s40900-025-00677-4
IMPACT FACTOR: N/A
CITED HALF-LIFE: N/A

START COMMENTARY

Foundational elements to ensure implementation success when incorporating human-centered design (HCD) strategies in community-based participatory research (CBPR) include inclusion of caregiver researchers, diverse stakeholder engagement, participatory planning and implementation, and an extensive iterative prototyping process (Figure 1). Shuro et al. highlight the importance of these elements in their evaluation of the 'Let's talk about vaccines' program. For example, 8 local caregivers were trained as researchers to be members of the project team. The caregiver researchers ensured that the voices of caregivers were prioritized, and their ability to speak the local language increased community participation and helped build trust between the community and the research team.

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13. Immunisation health workforce capacity building in Southeast Asia: reflections from training programme implementation in Cambodia and Lao PDR.

Saravanos G, Teo A, Yam E, Chou S, Chanlivong N, Chanthorn P, et al.

BMJ Glob Health. 2025 Feb 19;10(2).

PubMed ID: 39971585

ABSTRACT

The Immunization Agenda 2030 emphasises the need for a motivated, skilled and knowledgeable workforce equipped to plan, manage, implement and monitor immunisation programmes at all levels. The rapid introduction of COVID-19 vaccines during the pandemic highlighted the adaptability of the health workforce but also exposed gaps in professional development and learning. This practice paper describes the implementation of an immunisation training programme in the Kingdom of Cambodia and the Lao People's Democratic Republic. The programme was developed and delivered by the project team in partnership with local stakeholders and technical experts. A country-centric approach ensured that training programmes met each country's needs, while input from technical experts ensured an evidence-based programme that aligned with international standards. There were 445 training participants from professional groups across various levels and sectors of the health system. Training curricula included a range of differentiated training modules which aimed to build knowledge and skills to drive increased vaccine demand, improve service delivery and optimise monitoring and evaluation of programmes.The Gavi Learning and Performance Management framework supported a structured reflection of programme strengths, limitations and opportunities. Strengths were the country-centric and learner-centric approach and the high technical quality of the programme. The pandemic context necessitated agility and adaptation to meet changing country needs and priorities, however, this introduced some limitations. Future training programmes should undertake an enhanced assessment of training needs, workforce and digital capabilities and learning and performance management systems, alongside the development of country-driven immunisation workforce training roadmaps to ensure optimal impact and sustainability.

WEB: 10.1136/bmjgh-2024-018007

IMPACT FACTOR: 7.1

CITED HALF-LIFE: 3.2

START COMMENTARY

The training modules developed for the Kingdom of Cambodia and the Lao People's Democratic Republic (PDR) were designed to restore and strengthen immunization programs after the COVID-19 pandemic. They were tailored to meet each country's needs through collaboration with local

stakeholders. Training in Cambodia focused on improving staff's ability to address vaccine information, vaccine hesitancy, and concerns about adverse events following immunization (AEFI) while training in Lao PDR focused on improving data quality in their digital vaccine registry. An outline of each training module with target participants and learning objectives can be found in Table 1.

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14. Influence of maternal risk perception and vaccination knowledge on childhood vaccination intentions.

Md Suhaimi T, Ismail A, Ismail R, Rasudin N, Mohd Noor N, Jayapalan A, et al.

BMC Public Health. 2025 Feb 19;25(1):671.

PubMed ID: 39966911

ABSTRACT

BACKGROUND: Vaccine hesitancy remains a significant barrier to effective public health strategies aimed at overcoming the resurgence of vaccine-preventable diseases globally. This study aims to explore the roles of maternal knowledge, risk perception, health self-efficacy, and demographic characteristics in influencing the intention of antenatal mothers to accept childhood vaccination for their newborns.

METHODS: A descriptive and analytic cross sectional study design was conducted from March to September 2021, among antenatal mothers attending routine antenatal follow-ups at 17 public health clinics in Selangor, Malaysia. A validated and reliable self administered questionnaire was used to collect data on demographic characteristics, knowledge, risk perceptions, health self-efficacy, and vaccination intentions among antenatal mothers. Multiple linear regression analysis was used to identify determinants of vaccination intention among antenatal mothers.

RESULTS: The study included 796 antenatal mothers, predominantly Malay mothers (87.5%). The respondents presented a high mean vaccination intention score of 26.02 ± 2.77. Significant determinants of vaccination intention among antenatal mothers included the number of children ($\beta = 0.156$, 95% CI [0.013, 0.299], $p = 0.032$), knowledge score ($\beta = 0.397$, 95% CI [0.288, 0.506], $p < 0.001$), and risk perception score ($\beta = 0.047$, 95% CI [0.036, 0.058], $p < 0.001$). However, health self-efficacy was not significantly associated with vaccination intention.

CONCLUSION: Psychological and cognitive factors play important roles in influencing maternal vaccination intention. Intervention that aimed at increasing level of maternal knowledge and addressing maternal risk perception, focusing on less experienced mothers would be an effective strategies to improve maternal vaccination intention.

WEB: 10.1186/s12889-025-21815-3

IMPACT FACTOR: 3.5

CITED HALF-LIFE: 5.4

START COMMENTARY

Vaccine knowledge was assessed using the Immunization Knowledge Questionnaire consisting of 10 questions about vaccines, the vaccination process, and vaccine outcomes. Higher vaccine knowledge scores were associated with increased vaccination intention scores. The vaccine risk perception scale assessed the caregiver's view of the seriousness of consequences of vaccine-preventable diseases and their view of the likelihood that their child would catch a vaccine-preventable disease if unvaccinated. Higher risk perception scores were associated with higher vaccination intention scores. Those with more children indicated higher intent to vaccinate. As >70% of participants indicated that they had completed college, results may not be generalizable to the overall population of Malaysia.

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Additional Articles of Interest

1 Generative AI for vaccine misbelief correction: Insights from targeting extraversion and pseudoscientific beliefs. {Full Article}
2 Vaccination coverage and its associated factors among children under-5 in Somalia. {Full Article}
3 Childhood vaccination coverages in rural Guinea-Bissau before and during the early COVID-19 pandemic, a cohort study. {Full Article}
4 Factors associated with uptake of human papilloma virus vaccine among adolescent girls: A cross sectional survey on insights into HPV Infection Prevention in Kabarole District, Western Uganda. {Full Article}
5 Seasonal influenza vaccination in Kenya: What determines healthcare Workers' willingness to accept and recommend vaccination? {Full Article}
6 Prevalence and associated factors of immunization among under-five children in Somalia. {Full Article}
7 Associated factors for dropout of first versus third doses of pentavalent vaccination in Tanzania. {Full Article}
8 Assessment of the awareness of rabies, rabies prophylaxis guidelines and rabies practice among physicians in Sudan: a national cross-sectional study, 2024. {Full Article}
9 Attitudes and acceptance of vaccination against neglected tropical diseases: A multi-country study in Asia. {Full Article}
10 High confidence and demand for hepatitis E vaccine during an outbreak in Bentiu, South Sudan: A qualitative study. {Full Article}
11 Challenges to implementing mandatory hepatitis B vaccination: bridging immunization gaps among health workers in sub-Saharan Africa. {Full Article}
12 Socio-demographic disparities in basic under-two immunization coverage: insights from the 2016 Malawi demographic and health survey. {Full Article}
13 Gender-neutral vs. gender-specific strategies in school-based HPV vaccination programs: a systematic review and meta-analysis. {Full Article}
14 Novel tuberculosis vaccines based on TB10.4 and Ag85B: State-of-art and advocacy for good practices. {Full Article}
15 Mission 2030: Toward universal hepatitis B immunization. {Full Article}
16 Subunit antigen delivery: emulsion and liposomal adjuvants for next-generation vaccines. {Full Article}
17 Uptake, scale up, integration of vaccine, immunization, and health supply chain management technologies and innovation into policy: experience from Tanzania. {Full Article}
18 Varicella: is it time for a global vaccination programme? {Full Article}

19 Pertussis in Southeast Asia: country-level burden and recommendations from the Global Pertussis Initiative. {Full Article}

Appendix

The literature search for the April 2025 Vaccine Delivery Research Digest was conducted on March 17, 2025. We searched English language articles indexed by the US National Library of Medicine and published between February 15, 2025 and March 14, 2025. The search resulted in 320 items.

SEARCH TERMS

((((“vaccine”[tiab] OR “vaccines”[tiab] OR “vaccination”[tiab] OR “immunization”[tiab] OR “immunisation”[tiab] OR “vaccines”[MeSH Terms] OR (“vaccination”[MeSH Terms] OR “immunization”[MeSH Terms])) AND (“logistics”[tiab] OR “supply”[tiab] OR “supply chain”[tiab] OR “implementation”[tiab] OR “expenditures”[tiab] OR “financing”[tiab] OR “economics”[tiab] OR “Cost effectiveness”[tiab] OR “coverage”[tiab] OR “attitudes”[tiab] OR “belief”[tiab] OR “beliefs”[tiab] OR “refusal”[tiab] OR “Procurement”[tiab] OR “timeliness”[tiab] OR “systems”[tiab])) OR “vaccine delivery”[tiab] OR “vaccination refusal”[MeSH Terms] OR “immunization programs”[MeSH Terms] OR “zero dose”[tiab] OR “unvaccinated children”[tiab] OR “gavi”[tiab]) NOT (“in vitro”[tiab] OR “immune response”[tiab] OR “gene”[tiab] OR “chemistry”[tiab] OR “genotox*”[tiab] OR ”sequencing”[tiab] OR ”nanoparticle*”[tiab] OR “bacteriophage”[tiab] OR “exome”[tiab] OR “exogenous”[tiab] OR “electropor*“[tiab] OR”systems biology”[tiab] OR “animal model”[tiab] OR “cattle”[tiab] OR “sheep”[tiab] OR “goat”[tiab] OR “rat”[tiab] OR “pig”[tiab] OR “mice”[tiab] OR “mouse”[tiab] OR “murine”[tiab] OR “porcine”[tiab] OR “ovine”[tiab] OR “rodent”[tiab] OR “fish”[tiab])) AND “English”[Language] AND 2025/02/15:2025/03/14[Date - Publication]