VACCINE DELIVERY RESEARCH DIGEST

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

REPORT TO THE BILL & MELINDA GATES FOUNDATION

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1. Knowledge, Attitudes and Practices toward Dengue Fever, Vector Control, and Vaccine Acceptance Among the General Population in Countries from Latin America and Asia Pacific: A Cross-Sectional Study (GEMKAP).

Shafie A, Moreira E, Di Pasquale A, Demuth D, Yin J.

Vaccines (Basel). 2023 Apr 01;11(3).

PubMed ID: 36992159

ABSTRACT

Dengue represents a major public health concern. With effective vaccines in development, it is important to identify motivational factors to maximize dengue vaccine uptake. A cross-sectional, quantitative, electronic survey was administered to a nationally representative adult population (n = 3800) in Argentina, Brazil, Colombia, Mexico, Indonesia, Malaysia, and Singapore. Willingness to vaccinate against dengue, and Knowledge, Attitudes, and Practices (KAP) toward dengue, vector control, prevention, and vaccination were determined. The Capability, Opportunity, Motivation for Behavior change (COM-B) framework was used to identify factors correlated with dengue vaccine(s) uptake. KAP scores (standardized, 0-100% scale) resulted in a low global score for Knowledge (48%) and Practice (44%), and a moderate score for Attitude (66%); scores were comparable across countries. Of all respondents, 53% had a high willingness (Score: 8-10/10) to vaccinate against dengue, which was higher (59%) in Latin America (Argentina, Brazil, Colombia, Mexico) than in Asia Pacific (40%) (Indonesia, Malaysia, Singapore). Key factors significantly ($p < 0.05$) associated with increased willingness to vaccinate included accessibility to the public (subsidies and incentives) and trust in the healthcare system and government. A common approach to dengue prevention across endemic countries–with some country-specific customization, including education, vaccination, and vector control (multi-pronged)–may reduce dengue burden and improve outcomes.

WEB: 10.3390/vaccines11030575

IMPACT FACTOR: 4.086

CITED HALF-LIFE: 3.4

START COMMENTARY

In this cross-sectional study, *Shafie et al.* administered an electronic survey to a representative sample of adults in select Latin American and Asian geographies (Argentina, Brazil, Colombia, Mexico, Indonesia, Malaysia, and Singapore). Researchers aimed to quantitively assess motivation for dengue vaccine uptake, vector control, prevention, and vaccination using the Knowledge,

Attitudes, and Practices (KAP) framework, and Capability, Opportunity, Motivation, Behavior (COM-B) model was used to structure the analysis. *Figure 2* shows the composite score and individual factor scores for each country and globally, with factors associated with Attitudes consistently scoring higher than those associated with Knowledge or Practices, regardless of geography. This is in contrast to previous KAP study findings, which identified knowledge gaps about dengue infection in Brazil and Argentina. It is possible these contrasting results are due to bias in the respondent population. Regardless, it is clear that tailored vaccine implementation campaigns should include an iterative process and be context specific to improve outcomes and understanding of KAP towards vaccination.

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2. COVID-19 vaccine inequity in African low-income countries.

Kunyenje C, Chirwa G, Mboma S, Ng'ambi W, Mnjowe E, Nkhoma D, et al.

Front Public Health. 2023 Mar 24;11:1087662.
PubMed ID: 36950103

ABSTRACT

Equitable access and utilization of the COVID-19 vaccine is the main exit strategy from the pandemic. This paper used proceedings from the Second Extraordinary Think-Tank conference, which was held by the Health Economics and Policy Unit at the Kamuzu University of Health Sciences in collaboration with the Malawi Ministry of Health, complemented by a review of literature. We found disparities in COVID-19 vaccine coverage among low-income countries. This is also the case among high income countries. The disparities are driven mainly by insufficient supply, inequitable distribution, limited production of the vaccine in low-income countries, weak health systems, high vaccine hesitancy, and vaccine misconceptions. COVID-19 vaccine inequity continues to affect the entire world with the ongoing risks of emergence of new COVID-19 variants, increased morbidity and mortality and social and economic disruptions. In order to reduce the COVID-19 vaccination inequality in low-income countries, there is need to expand COVAX facility, waive intellectual property rights, transform knowledge and technology acquired into vaccines, and conduct mass COVID-19 vaccination campaigns.

WEB: 10.3389/fpubh.2023.1087662
IMPACT FACTOR: 2.483
CITED HALF-LIFE: 3.0

START COMMENTARY

In this review, *Kunyenje et al.* discuss COVID-19 vaccine equity globally. Authors performed a comprehensive literature review and built off findings from a Health Economics and Policy Unit conference. *Figure 1* shows the proportion of people vaccinated against COVID-19 among the top 10 high-income countries (HIC) and the bottom 10 low-income countries (LIC). Unsurprisingly, the proportion of the population partially or fully vaccinated was higher in HICs (1: Qatar 105.75%; 10: Liechtenstein 67.23%) than in LICs (1: Mozambique 55.96%; 10: Burundi <1%), and 9 out of 10 of the bottom 10 LICs had <50% coverage. Many barriers contribute to vaccine equity in LICs, including lack of funds, intellectual property rights, vaccine nationalism, weak health systems, and misconceptions surrounding vaccines. With the global goal of 70% vaccination coverage, many LICs have continued to have inequitable access to adequate vaccine doses. Not only is this unethical, with large groups of unvaccinated or under-vaccinated people, there is continued risk of SARS-CoV-

2 spread and the increased likelihood of new variants. To aid fair distribution, authors recommend expanding COVAX, waiving control of intellectual property rights, improving manufacturing capacity in LICs, improving health systems, and implementing a mass COVID-19 vaccination campaign in areas of disparate coverage.

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3. Systematic Review of Safety of RTS,S with AS01 and AS02 Adjuvant Systems Using Data from Randomized Controlled Trials in Infants, Children, and Adults.

Yihunie W, Kebede B, Tegegne B, Getachew M, Abebe D, Aschale Y, et al.

Clin Pharmacol. 2023 Mar 22;15:21-32.

PubMed ID: 36941908

ABSTRACT

BACKGROUND: Emergence of antimalarial drugs and insecticides resistance alarms scientists to develop a safe and effective malaria vaccine. A pre-erythrocytic malaria vaccine called RTS,S has made great strides.

AIM: The review was aimed to assess the safety of the candidate malaria vaccine RTS,S with AS01 and AS02 adjuvants using data from Phase I-III randomized controlled clinical trials (RCTs).

METHODS: This systematic review was conducted based on PRISMA 2020. Regardless of time of publication year, all articles related with safety of RTS,S, RCTs published in the English language were included in the study. The last search of databases, and registry was conducted on 30 May, 2022. Pubmed, Google Scholar, Cochrane Library, Wiley Online Library, and Clinical trials.gov were thoroughly searched for accessible RCTs on the safety of RTS,S malaria vaccine. The studies were screened in three steps: duplicate removal, title and abstract screening, and full-text review. The included studies' bias risk was assessed using the Cochrane risk of bias tool for RCTs. This systematic review is registered at Prospero (registration number: CRD42021285888). The qualitative descriptive findings from the included published studies were reported stratified by clinical trial phases.

FINDINGS: A total of thirty-five eligible safety studies were identified. Injection site pain and swelling, febrile convulsion, fever, headache, meningitis, fatigue, gastroenteritis, myalgia, pneumonia, reactogenicity, and anemia were the most commonly reported adverse events. Despite few clinical trials reported serious adverse events, none of them were related to vaccination.

CONCLUSION: Most of the adverse events observed from RTS,S/AS01 and RTS,S/AS02 malaria vaccines were reported in the control group and shared by other vaccines. Hence, the authors concluded that both RTS,S/AS01 and RTS,S/AS02 malaria vaccines are safe.

WEB: 10.2147/CPAA.S400155
IMPACT FACTOR: ***unavailable***
CITED HALF-LIFE: 5.6

START COMMENTARY

In this systematic review, *Yihunie et al.* utilized data from randomized clinical trials to assess the safety of the candidate malaria vaccine and adjuvant systems, RTS,S/AS01 and RTS,S/AS02. Data from phase I, II, and III trials were included, and any qualitative results were stratified by clinical trial phase. Authors found there to be low risk of bias for each of the included RCTs; reporting bias was evaluated based on the randomization process, deviations from the intended interventions, measurement of the outcome data, gaps in the outcome analysis, and reported result selection (*Figure 2)*. *Table 2* details the commonly reported adverse events following RTS,S/AS01 and RTS,S/AS02 by phase, with the most commonly reported adverse event being injection site pain or swelling (68.57%, n = 24 studies). Most adverse events observed were also associated with other vaccines. Overall, this review found that RTS,S/AS01 and RTS,S/AS02 vaccines are safe for use.

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4. Factors associated with incomplete vaccination and negative antibody test results for measles, mumps, and hepatitis A among children followed in the MINA-BRAZIL cohort.

Ferreira M, Cardoso M, Mazzucchetti L, Sabino E, Avelino-Silva V.

Rev Inst Med Trop Sao Paulo. 2023 Mar 20;65:e16.

PubMed ID: 36921204

ABSTRACT

Vaccination coverage has been dropping in Brazil and other countries. In addition, immune responses after vaccination may not be homogeneous, varying according to sociodemographic and clinical factors. Understanding the determinants of incomplete vaccination and negative antibody test results may contribute to the development of strategies to improve vaccination effectiveness. In this study, we aimed to investigate the frequency of vaccine adherence, factors associated with incomplete vaccination for measles, mumps, rubella (MMR) and hepatitis A, and factors associated with the seronegative test results for measles, mumps and hepatitis A at 2 years of age. This was a population-based cohort that addressed health conditions and mother/infant nutrition in Cruzeiro do Sul city, Brazil. Vaccination data were obtained from official certificates of immunization. The children underwent blood collection at the two-year-old follow-up visit; the samples were analyzed using commercially available kits to measure seropositivity for measles, mumps, and hepatitis A. We used modified Poisson regression models adjusted for covariates to identify factors associated with incomplete vaccination and negative serology after vaccination. Out of the 825 children included in the study, adherence to the vaccine was 90.6% for MMR, 76.7% for the MMRV (MMR + varicella), and 74.9% for the hepatitis A vaccine. For MMR, after the adjustment for covariates, factors associated with incomplete vaccination included: white-skinned mother; paid maternity leave; raising more than one child; lower number of antenatal consultations; and attending childcare. For hepatitis A, the factors included: white-skinned mother and not having a cohabiting partner. The factors with statistically significant association with a negative antibody test result included: receiving Bolsa Familia allowance for measles and mumps; incomplete vaccination for measles; and vitamin A deficiency for mumps. Strategies to improve the efficiency of vaccine programs are urgently needed. These include improvements in communication about vaccine safety and efficacy, and amplification of access to primary care facilities, prioritizing children exposed to the sociodemographic factors identified in this study. Additionally, sociodemographic factors and vitamin A deficiency may impact the immune responses to vaccines, leading to an increased risk of potentially severe and preventable diseases.

WEB: 10.1590/S1678-9946202365016

IMPACT FACTOR: 2.169

CITED HALF-LIFE: 8.4

START COMMENTARY

In this analysis, *Ferreria et al.* identified factors associated with incomplete vaccination and varied immune response to vaccination among a large, population-based cohort in Northern Brazil. The study included 825 children who received routine immunizations and underwent blood draws at 2 years- of follow up to test for antibodies. *Table 1* shows the percentage of full vaccination among participants, with the lowest coverage found for Hepatitis A (74.9%, 95% CI: 71.8% - 77.8%) and Tetraviral MMRV (76.7%, 95% CI: 73.7% - 79.6%). *Table 3* presents the final predictive model of incomplete vaccination for MMR and Hepatitis A. The included variables associated with higher risk of incomplete vaccination for MMR were mother's skin color, paid work, multiparity, less than 6 antenatal care visits and attending childcare for MMR; in the incomplete Hepatitis A vaccine model, mother's skin color and not having a cohabiting partner were included. Findings in this paper demonstrate that MMR, MMRV, and hepatitis A vaccines failed to reach the recommended coverage of 95% and provide supportive evidence towards declining trends of vaccine adherence in Brazil since 2016. Additionally, authors show some nutritional factors (including vitamin A deficiency) to be associated with reduced immune response, suggesting supplementation of nutrients in food to be a helpful intervention in children.

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5. Ethical considerations of the vaccine development process and vaccination: a scoping review.

Jalilian H, Amraei M, Javanshir E, Jamebozorgi K, Faraji-Khiavi F.

BMC Health Serv Res. 2023 Mar 16;23(1):255.

PubMed ID: 36918888

ABSTRACT

BACKGROUND: Various vaccines have been developed and distributed worldwide to control and cope with COVID-19 disease. To ensure vaccines benefit the global community, the ethical principles of beneficence, justice, non-maleficence, and autonomy should be examined and adhered to in the process of development, distribution, and implementation. This study, therefore, aimed to examine ethical considerations of vaccine development and vaccination processes.

METHODS: A scoping review of the literature was conducted based on the Arkesy and O'Malley protocol to identify eligible studies published until November 2021. We searched Web of Science, PubMed, Scopus, and SciELO databases. The search was conducted using combinations of Medical Subject Heading (MeSH) search terms and keywords for Ethics, COVID-19, and vaccines in abstract, keywords, and title fields to retrieve potentially relevant publications. We included any study that reported one of the four principles of medical ethics: autonomy, justice, non-maleficence, and beneficence in the COVID-19 vaccine development and distribution and implementation of vaccinations. Letters, notes, protocols, and brief communications were excluded. In addition, we searched gray literature to include relevant studies (ProQuest database, conferences, and reports). Data were analyzed using framework analysis.

RESULTS: In total, 43 studies were included. Ethical considerations concluded two themes: (1) production and (2) distribution and vaccination. The production process consisted of 16 codes and 4 main Categories, distribution and vaccination process consisted of 12 codes and 4 main Categories. Moreover, the ethical considerations of special groups were divided into four main groups: health care workers (HCWs) (five codes), children and adolescents (five codes), the elderly (one code), and ethnic and racial minorities (three codes).

CONCLUSION: Due to the externalities of pandemics and the public and social benefits and harms of vaccination, it is not feasible to adhere to all four principles of medical ethics simultaneously and perfectly. This issue confronts individuals and policymakers with several moral dilemmas. It seems that decision-making based on the balance between social benefit and social harm is a better criterion in this regard, and the final decision should be made based on maximizing the public benefit and minimizing the public harm.

WEB: 10.1186/s12913-023-09237-6
IMPACT FACTOR: 1.987
CITED HALF-LIFE: 5.6

START COMMENTARY

In this scoping review, *Jalilian et al.* identified ethical considerations within vaccine production, vaccine distribution and vaccination, and additional considerations associated with vaccinating adolescents, the elderly, HCWs, and ethnic and racial groups. *Figure 1* shows the bioethics framework (autonomy, justice, non-maleficence, and beneficence) utilized to categorize the considerations evaluated. *Tables 2 & 3* highlight considerations in vaccine production and vaccine distribution and vaccination, respectively. Authors note the priority is the production and distribution of safe, effective, and affordable vaccines, which requires compliance with published global standards and guidelines. In clinical trial settings, manufacturers should take more consideration of inclusion criteria, and ensure access to treatment and care in the event of adverse reactions. Additionally, authors highlight the ability of vaccine development, as well as purchasing power should be considered in vaccine distribution. *Table 5* presents ethical considerations of specific groups, with the literature primarily exploring considerations surrounding healthcare providers (n=13) and children (n=7), as opposed to the elderly (n=4) and ethnic and racial groups (n=4). One major gap in this paper is that the authors did not include pregnant and breastfeeding women, or individuals with lowered immune responses in their analysis, two major groups requiring special considerations in developing and distributing vaccinations.

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6. Maternal immunisation against Group B Streptococcus: A global analysis of health impact and cost-effectiveness.

Procter S, Gonçalves B, Paul P, Chandna J, Seedat F, Koukounari A, et al.

PLoS Med. 2023 Mar 16;20(3):e1004068.

PubMed ID: 36917564

ABSTRACT

BACKGROUND: Group B Streptococcus (GBS) can cause invasive disease (iGBS) in young infants, typically presenting as sepsis or meningitis, and is also associated with stillbirth and preterm birth. GBS vaccines are under development, but their potential health impact and cost-effectiveness have not been assessed globally.

METHODS AND FINDINGS: We assessed the health impact and value (using net monetary benefit (NMB), which measures both health and economic effects of vaccination into monetary units) of GBS maternal vaccination in an annual cohort of 140 million pregnant women across 183 countries in 2020. Our analysis uses a decision tree model, incorporating risks of GBS-related health outcomes from an existing Bayesian disease burden model. We extrapolated country-specific GBS-related healthcare costs using data from a previous systematic review and calculated quality-adjusted life years (QALYs) lost due to infant mortality and long-term disability. We assumed 80% vaccine efficacy against iGBS and stillbirth, following the WHO Preferred Product Characteristics, and coverage based on the proportion of pregnant women receiving at least 4 antenatal visits. One dose was assumed to cost $50 in high-income countries, $15 in upper-middle income countries, and $3.50 in low-/lower-middle-income countries. We estimated NMB using alternative normative assumptions that may be adopted by policymakers. Vaccinating pregnant women could avert 127,000 (95% uncertainty range 63,300 to 248,000) early-onset and 87,300 (38,100 to 209,000) late-onset infant iGBS cases, 31,100 deaths (14,400 to 66,400), 17,900 (6,380 to 49,900) cases of moderate and severe neurodevelopmental impairment, and 23,000 (10,000 to 56,400) stillbirths. A vaccine effective against GBS-associated prematurity might also avert 185,000 (13,500 to 407,000) preterm births. Globally, a 1-dose vaccine programme could cost $1.7 billion but save $385 million in healthcare costs. Estimated global NMB ranged from 1.1 $billion$(-0.2 to 3.8 billion) under the least favourable normative assumptions to $17 billion ($9.1 to 31 billion) under the most favourable normative assumptions. The main limitation of our analysis was the scarcity of data to inform some of the model parameters such as those governing health-related quality of life and long-term costs from disability, and how these parameters may vary across country contexts.

CONCLUSIONS: In this study, we found that maternal GBS vaccination could have a large impact on infant morbidity and mortality. Globally, a GBS maternal vaccine at reasonable prices is likely to be a cost-effective intervention.

WEB: 10.1371/journal.pmed.1004068

IMPACT FACTOR: 10.50

CITED HALF-LIFE: 8.4

START COMMENTARY

In this cost-effectiveness analysis, *Procter et al.* evaluate the health impact and cost-effectiveness of vaccination against Group B Streptococcus (GBS) globally (140 million pregnant women, 183 countries). *Figure 1* shows the decision tree authors used for GBS-related outcomes in children in this evaluation, with invasive GBS (iGBS) as one of the major health-related outcomes. Authors found that while a global maternal GBS vaccination program would lead to an overall increase in costs, this is offset by healthcare cost savings, and significant reductions in morbidity and mortality globally. *Figure 2* shows the net monetary benefit (NMB) of GBS maternal vaccination; under favorable normative assumptions, GBS vaccination had a positive NMB in all regions, but less favorable assumptions showed a negative NMB for Central and Southern Asia, Europe and Northern America, and Oceania. One assumption of major influence on the overall QALYs is the inclusion of stillbirth; were stillbirth to be included, GBS vaccination shows to be positive NMB for less favorable assumptions. Overall, GBS vaccination does appear to be cost-effective if implemented globally, but discourse around the specific health outcomes included in the assessment should continue.

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7. Data collection systems for active safety surveillance of vaccines during pregnancy in low- and middle-income countries: developing and piloting an assessment tool (VPASS).

Belizán M, Rodriguez Cairoli F, Mazzoni A, Goucher E, Zaraa S, Matthews S, et al.

BMC Pregnancy Childbirth. 2023 Mar 15;23(1):172.

PubMed ID: 36915061

ABSTRACT

BACKGROUND: There is an urgent need for active safety surveillance to monitor vaccine exposure during pregnancy in low- and middle-income countries (LMICs). Existing maternal, newborn, and child health (MNCH) data collection systems could serve as platforms for post-marketing active surveillance of maternal immunization safety. To identify sites using existing systems, a thorough assessment should be conducted. Therefore, this study had the objectives to first develop an assessment tool and then to pilot this tool in sites using MNCH data collection systems through virtual informant interviews.

METHODS: We conducted a rapid review of the literature to identify frameworks on population health or post-marketing drug surveillance. Four frameworks that met the eligibility criteria were identified and served to develop an assessment tool capable of evaluating sites that could support active monitoring of vaccine safety during pregnancy. We conducted semi-structured interviews in six geographical sites using MNCH data collection systems (DHIS2, INDEPTH, and GNMNHR) to pilot domains included in the assessment tool.

RESULTS: We developed and piloted the “VPASS (Vaccines during Pregnancy - sites supporting Active Safety Surveillance) assessment tool” through interviews with nine stakeholders, including central-level systems key informants and site-level managers from DHIS2 and GNMNHR; DHIS2 in Kampala (Uganda) and Kigali (Rwanda); GNMNHR from Belagavi (India) and Lusaka (Zambia); and INDEPTH from Nanoro (Burkina Faso) and Manhica (Mozambique). The tool includes different domains such as the system’s purpose, the scale of implementation, data capture and confidentiality, type of data collected, the capability of integration with other platforms, data management policies and data quality monitoring. Similarities among sites were found regarding some domains, such as data confidentiality, data management policies, and data quality monitoring. Four of the six sites met some domains to be eligible as potential sites for active surveillance of vaccinations during pregnancy, such as a routine collection of MNCH individual data and the capability of electronically integrating individual MNCH outcomes with information related to vaccine exposure during pregnancy. Those sites were: Rwanda (DHIS2), Manhica (IN-DEPTH), Lusaka (GNMNHR), and Belagavi (GNMNHR).

CONCLUSION: This study's findings should inform the successful implementation of active safety surveillance of vaccines during pregnancy by identifying and using active individual MNCH data collection systems in LMICs.

WEB: 10.1186/s12884-023-05417-8
IMPACT FACTOR: 3.105
CITED HALF-LIFE: 5.0

START COMMENTARY

In this study, *Belizan et al* develop and pilot the Vaccines during Pregnancy – sites supporting Active Safety Surveillance (VPASS) assessment tool to improve vaccine safety surveillance during pregnancy in low- and middle- income countries (LMICs). *Table 1* shows the domains and criteria included in the VPASS assessment tool. The VPASS assessment tool was piloted against 3 Maternal, Newborn, and Child Health (MNCH) data collection systems across 6 sites. These systems were DHIS-2 (Rwanda, Uganda), INDEPTH (Burkina Faso, Mozambique), and GNMNHR (Zambia, India). *Table 2* shows the results of the VPASS assessment tool against the MNCH data collection systems. The authors used qualitative interviews as the primary source of information; future results would benefit from the additional of quantitative indicators. Additionally, authors utilized a small sample size, which limits the generalizability of results. Overall, this work highlights the need for active vaccine safety surveillance for vaccines given during pregnancy in LMICs generally.

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8. A scoping review of facilitators and barriers influencing the implementation of surveillance and oral cholera vaccine interventions for cholera control in lower- and middle-income countries.

Trolle H, Forsberg B, King C, Akande O, Ayres S, Alfvén T, et al.

BMC Public Health. 2023 Mar 14;23(1):455.

PubMed ID: 36890476

ABSTRACT

BACKGROUND: Cholera still affects millions of people worldwide, especially in lower- and middle-income countries (LMICs). The Global Task Force on Cholera Control (GTFCC) has identified surveillance and oral cholera vaccines as two critical interventions to actualise the global roadmap goals-reduction of cholera-related deaths by 90% and decreasing the number of cholera endemic countries by half by 2030. Therefore, this study aimed to identify facilitators and barriers to implementing these two cholera interventions in LMIC settings.

METHODS: A scoping review using the methods presented by Arksey and O'Malley. The search strategy involved using key search terms (cholera, surveillance, epidemiology and vaccines) in three databases (PubMed, CINAHL and Web of Science) and reviewing the first ten pages of Google searches. The eligibility criteria of being conducted in LMICs, a timeline of 2011-2021 and documents only in English were applied. Thematic analysis was performed, and the findings were presented according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension.

RESULTS: Thirty-six documents met the predefined inclusion criteria, covering 2011 to 2021. There were two themes identified regarding the implementation of surveillance: timeliness and reporting (1); and resources and laboratory capabilities (2). As for oral cholera vaccines, there were four themes identified: information and awareness (1); community acceptance and trusted community leaders (2); planning and coordination (3); and resources and logistics (4). Additionally, adequate resources, good planning and coordination were identified to be operating at the interface between surveillance and oral cholera vaccines.

CONCLUSION: Findings suggest that adequate and sustainable resources are crucial for timely and accurate cholera surveillance and that oral cholera vaccine implementation would benefit from increased community awareness and engagement of community leaders.

WEB: 10.1186/s12889-023-15326-2

IMPACT FACTOR: 2.521

CITED HALF-LIFE: 6.0

START COMMENTARY

In this review, *Trolle et al.* identify facilitators and barriers to the surveillance and implementation of oral cholera vaccines in low- and middle- income countries (LMICs). Documentss (n=36) included in this study were assessed by thematic area specific to the cholera intervention. Surveillance interventions were evaluated on timeliness and reporting and resources and laboratory capability; oral cholera vaccine (OVC) interventions were evaluated on information and awareness, community acceptance, planning and coordination, and resources and logistics (*Table 3)*. The authors found accurate and timely information on cholera and OCV delivery from a trusted information source to the community to be an important facilitator. With existing challenges of misinformation and distrust of vaccines, providing accurate and thorough information to potential vaccine recipients is an important piece in the implementation of OCV interventions. Authors found OCV interventions needed to be tailored to the specific context of geographies at-risk of cholera outbreak to be most successful. Additionally, collaboration between community members, stakeholders and representatives from government bodies and NGOs is crucial for the success of both surveillance and OCV campaign activities. In order to make major progress on reducing the burden of cholera, proper resources and good planning and coordination, are important to link surveillance to OCV interventions.

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9. Cost-effectiveness analysis of typhoid conjugate vaccines in an outbreak setting: a modeling study.

Phillips M, Antillon M, Bilcke J, Bar-Zeev N, Limani F, Debellut F, et al.

BMC Infect Dis. 2023 Mar 10;23(1):143.

PubMed ID: 36890448

ABSTRACT

BACKGROUND: Several prolonged typhoid fever epidemics have been reported since 2010 throughout eastern and southern Africa, including Malawi, caused by multidrug-resistant Salmonella Typhi. The World Health Organization recommends the use of typhoid conjugate vaccines (TCVs) in outbreak settings; however, current data are limited on how and when TCVs might be introduced in response to outbreaks.

METHODOLOGY: We developed a stochastic model of typhoid transmission fitted to data from Queen Elizabeth Central Hospital in Blantyre, Malawi from January 1996 to February 2015. We used the model to evaluate the cost-effectiveness of vaccination strategies over a 10-year time horizon in three scenarios: (1) when an outbreak is likely to occur; (2) when an outbreak is unlikely to occur within the next ten years; and (3) when an outbreak has already occurred and is unlikely to occur again. We considered three vaccination strategies compared to the status quo of no vaccination: (a) preventative routine vaccination at 9 months of age; (b) preventative routine vaccination plus a catch-up campaign to 15 years of age; and (c) reactive vaccination with a catch-up campaign to age 15 (for Scenario 1). We also explored variations in outbreak definitions, delays in implementation of reactive vaccination, and the timing of preventive vaccination relative to the outbreak.

RESULTS: Assuming an outbreak occurs within 10 years, we estimated that the various vaccination strategies would prevent a median of 15-60% of disability-adjusted life-years (DALYs). Reactive vaccination was the preferred strategy for WTP values of $0-300 per DALY averted. For WTP values > $300, introduction of preventative routine TCV immunization with a catch-up campaign was the preferred strategy. Routine vaccination with a catch-up campaign was cost-effective for WTP values above $890 per DALY averted if no outbreak occurs and > $140 per DALY averted if implemented after the outbreak has already occurred.

CONCLUSIONS: Countries for which the spread of antimicrobial resistance is likely to lead to outbreaks of typhoid fever should consider TCV introduction. Reactive vaccination can be a cost-effective strategy, but only if delays in vaccine deployment are minimal; otherwise, introduction of preventive routine immunization with a catch-up campaign is the preferred strategy.

WEB: 10.1186/s12879-023-08105-2
IMPACT FACTOR: 2.688
CITED HALF-LIFE: 5.0

START COMMENTARY

In this cost-effectiveness evaluation, *Phillips et al.* model typhoid conjugate vaccines (TCV) in an outbreak scenario in Malawi. *Table 2* shows the strategies evaluated in each scenario: a base case (no vaccination), a preventive strategy with routine vaccination at 9 months of age ("routine"), a preventive strategy with routine vaccination and a catch-up campaign up to 15 years of age ("routine + catch-up"), and a reactive vaccination strategy with routine vaccination and a catch-up campaign. Table 4 shows the expected cost-effectiveness of vaccination strategies over a 10-year time horizon with 3 scenarios assessed: (1) an outbreak occurs over the 10-year time horizon (randomized timing; Scenario 1), (2) an outbreak does not occur (i.e. assuming the pre-outbreak incidence; Scenario 2), and (3) an outbreak has already occurred and another one is unlikely (i.e. assuming the post-outbreak incidence; Scenario 3). Scenario 1 has the lowest expected total costs per 100,000 individuals; *Figure 2* shows the cost-effectiveness acceptability of Scenario 1 with the varied strategies. The optimal vaccination strategy did not vary substantially depending on how long before the outbreak preventive vaccination was implemented. Authors do point out that there is currently no defined for identifying outbreaks of typhoid fever across different settings, which is a major gap in typhoid fever surveillance efforts. Additionally, authors do provide a link to the data and code used for the dynamic model should others be interested.

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10. Evaluation of vaccine storage and distribution practices in rural healthcare facilities in Kenya.

Sinnei D, Karimi P, Maru S, Karengera S, Bizimana T.

J Pharm Policy Pract. 2023 Feb 24;16(1):25.

PubMed ID: 36810145

ABSTRACT

BACKGROUND: Vaccines require cold chain storage conditions, and good distribution practices throughout the supply chain to maintain their quality and potency. However, in the last mile of the vaccines supply chain, these requirements may not be guaranteed resulting in reduced effectiveness which could lead to an upsurge in vaccine preventable morbidity and mortality. The aim of this research was to evaluate vaccine storage and distribution practices in the last mile of vaccine supply chain in Turkana County.

METHODS: A descriptive cross-sectional study was conducted from January 2022 to February 2022 across seven sub-counties in Turkana County, Kenya, to assess vaccine storage and distribution practices. The study sample size was 128 county health professionals across 4 hospitals, 9 health centers, and 115 dispensaries. The respondents were selected using simple random sampling within the facilities strata. Data were collected using a structured questionnaire, adapted, and adopted from a standardized WHO questionnaire on effective vaccines management and administered to one healthcare personnel working in the immunization supply chain per facility. Data were analyzed using excel and presented as percentages in table forms.

RESULTS: A total of 122 health care workers participated in the study. Most respondents (89%, n = 109) had utilized a vaccine forecasting sheet, but only 81% did have an established maximum-minimum level inventory control system. Many of the respondents had sufficient knowledge of ice pack conditioning although 72% had adequate vaccine carriers and ice packs. Only 67% of respondents had a complete set of twice-daily manual temperature records at the facility. Most refrigerators complied with the WHO specifications but only 80% of them had functional fridge-tags. The number of facilities that had a routine maintenance plan was below average while only 65% had an adequate contingency plan.

CONCLUSION: Rural health facilities have suboptimal supply of vaccine carriers and icepacks for effective storage and distribution of vaccines. In addition, some vaccine fridges lack functional fridge-tags for proper temperature monitoring. Routine maintenance and contingency plans remain a challenge to ensure optimal service delivery.

WEB: 10.1186/s40545-023-00535-2

IMPACT FACTOR: ***unavailable***

CITED HALF-LIFE: 2.1

START COMMENTARY

In this descriptive study, *Sinnei et al.* assessed vaccine storage and distribution practices in rural facilities in Turkana County, Kenya. Health workers participated in interviews to test their knowledge and practices and scored against recommended WHO standard practices. Authors assessed vaccine storage and transportation (*Table 1),* cold chain management practices (*Table 2)*, infrastructure and adherence to planned maintenance (*Table 3)*, and vaccine availability and management practices (*Table 4).* Authors found that while most health professionals interviewed (89%) knew how to condition icepacks properly, only 73% of icepacks and vaccine carriers were qualified to be adequate for safe vaccine storage. Authors also found gaps in health worker knowledge of proper vial testing for temperatures, but this was based on ability to "vividly describe the shake test." However, "vividly" does not appear to be defined, limiting conclusions that can be made about health worker knowledge and understanding. One major limitation of this paper was a non-representative geographical distribution of facilities, limiting applicability to rural areas more generally. Regardless, findings do indicate suboptimal vaccine storage and distribution to rural health facilities assessed in Kenya, suggesting an area hindering service delivery.

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Appendix

The literature search for the [MONTH] 2023 Vaccine Delivery Research Digest was conducted on April 1, 2023. We searched English language articles indexed by the US National Library of Medicine and published between February 15, 2023 and March 14, 2023. The search resulted in [624] items.

SEARCH TERMS

(((((vaccine[tiab] OR vaccines[tiab] OR vaccination[tiab] OR immunization[tiab] OR immunisation[tiab] OR vaccine[mesh] OR immunization[mesh]) 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])) 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[LA]) (“2023/15/11”[PDAT] : “2023/14/12”[PDAT]))