VACCINE DELIVERY RESEARCH DIGEST

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

REPORT TO THE GATES FOUNDATION

PRODUCED BY: SUTTON, A. & SHARMA, M.

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{Abstract & START Commentary} {Full Article}

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1. [**Report from the World Health Organization's immunization and vaccines-related implementation research advisory committee (IVIR-AC) ad hoc meeting, 28 June - 1 July 2024.**](#)

Lambach P, Silal S, Sbarra A, Crowcroft N, Frey K, Ferrari M, et al.

Vaccine. 2024 Sep 14;42(26):126307.

PubMed ID: 39276622

ABSTRACT

The World Health Organization's Immunization and Vaccines-related Implementation Research Advisory Committee (IVIR-AC) serves to independently review and evaluate vaccine-related research to maximize the potential impact of vaccination programs. From 28 June - 1 July 2024, IVIR-AC was convened for an ad hoc meeting to discuss new evidence on criteria for rubella vaccine introduction and the risk of congenital rubella syndrome. This report summarizes background information on rubella virus transmission and the burden of congenital rubella syndrome, meeting structure and presentations, proceedings, and recommendations.

START COMMENTARY

The Implementation Research Advisory Committee (IVIR-AC) evaluated two modeling analyses of rubella vaccine introduction in advance of the World Health Organization's Strategic Advisory Group of Experts on Immunization (SAGE) discussion of rubella vaccine introduction policy. The Institute for Disease Modeling (Gates Foundation) provided results from a regional-level modeling analysis of sub-Saharan Africa and a team from Pennsylvania State University presented estimates from a subnational modeling analysis of congenital rubella syndrome (CRS) following rubella vaccination introduction in Nigeria. The IVIR-AC found that methodologies of the two analyses were appropriate and modeling results suggest that CRS incidence will increase due to demographic changes in countries where rubella vaccines have not been introduced, but that this increase could be mitigated by carefully planned rubella vaccination introduction in countries with sustained vaccine coverage at a sufficient level, which may be lower than the currently recommended 80%.

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2. [Vaccination governance in protracted conflict settings: the case of northwest Syria.](#)

Baatz R, Ekzayez A, Najib Y, Alkhalil M, Salem M, Alshiekh M, et al.

ABSTRACT

BACKGROUND: Effective vaccination governance in conflict-affected regions poses unique challenges. This study evaluates the governance of vaccination programs in northwest Syria, focusing on effectiveness, efficiency, inclusiveness, data availability, vision, transparency, accountability, and sustainability.

METHODS: Using a mixed-methods approach, and adapting Siddiqi's framework for health governance, data were collected through 14 key informant interviews (KIIs), a validating workshop, and ethnographic observations. Findings were triangulated to provide a comprehensive understanding of vaccination governance.

RESULTS: The study highlights innovative approaches used to navigate the complex health governance landscape to deliver vaccination interventions, which strengthened sub-national vaccination structures such as The Syria Immunisation Group (SIG). The analysis revealed several key themes. Effectiveness and efficiency were demonstrated through cold-chain reliability and extensive outreach activities, though formal reports lacked detailed analysis of vaccine losses and linkage between disease outbreak data and coverage statistics. Key informants and workshop participants rated the vaccination strategy positively but identified inefficiencies due to irregular funding and bureaucracy. Inclusiveness and data availability were prioritised, with outreach activities targeting vulnerable groups. However, significant gaps in demographic data and reliance on paper-based systems hindered comprehensive coverage analysis. Digitalisation efforts were noted but require further support. The SIG demonstrated a clear strategic vision supported by international organizations such as the World Health Organization, yet limited partner participation in strategic planning raised concerns about broader ownership and engagement. While the SIG was perceived as approachable, the lack of public documentation and financial disclosure limited transparency. Internal information sharing was prevalent, but public communication strategies were insufficient. Accountability and sustainability faced challenges due to a decentralized structure and reliance on diverse donors. Despite stabilizing factors such as decentralization and financial continuity, fragmented oversight and reliance on donor funding remained significant concerns.

DISCUSSION: The study highlights the complexities of vaccination governance in conflict-affected areas. Comparisons with other conflict zones underscore the importance of local organisations and international support. The SIG's role is pivotal, but its legitimacy, transparency, and inclusivity

require improvement. The potential transition to early recovery in Syria poses additional challenges to SIG's sustainability and integration into national programs.

CONCLUSION: The governance of vaccination in northwest Syria is multifaceted, involving multiple stakeholders and lacking a legitimate government. Enhancing transparency, local ownership, and participatory decision-making are crucial for improving governance. The role of international bodies is essential, emphasising the need for structured feedback mechanisms and transparent monitoring processes to ensure the program's success and sustainability.

WEB: 10.1186/s12913-024-11413-1
IMPACT FACTOR: 2.7
CITED HALF-LIFE: 5.6

START COMMENTARY

During the Syria conflict, which began in 2011, supply chain disruptions, human resource shortages, and lack of local governance resulted in reduced vaccination coverage and outbreaks of vaccine-preventable diseases. Local and international organizations implemented emergency vaccination campaigns and created the Syrian Immunisation Group (SIG) to coordinate vaccination efforts. Baatz et al. highlight the need for a governance model that combines top-down and bottom-up approaches to effectively improve vaccination programs in conflict settings, with international organizations providing central management and coordination of activities while partnering with local organizations to promote local ownership and responsibility for vaccine program success.

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3. [Governance matters: Exploring the impact of governance on routine immunization performance in 54 African countries: A 10-year (2012-2021) analysis using linear mixed models.](#)

Kamadjeu R, Wyka K, Kelvin E.

ABSTRACT

BACKGROUND: Immunization coverage across numerous African nations has, unfortunately, shown little improvement and, in some cases, has even decreased over the past decade, leaving millions of children vulnerable to vaccine-preventable diseases. While efforts to improve immunization performance have primarily focused on the health system, effective delivery of immunization services is intricately linked to a country's governance, which, in this context, reflects a government's ability to provide comprehensive services to its citizens. This study investigated the relationship between governance, measured using the Mo Ibrahim Index for African Governance, and the trajectory of immunization coverage for three vaccines in 54 African countries from 2012 to 2021.

METHODS: We conducted an ecological study utilizing publicly available datasets, the WHO/UNICEF estimates of National Immunization Coverage and the Ibrahim Index of African Governance score (IIAG). We described the trends in routine immunization performance, evaluated and assessed the impact of governance on immunization coverage across 54 African countries for the period 2012 to 2021, using linear mixed models and focusing on three vaccines provided through the Expanded Program on Immunization (DTPCV1, DTPCV3, and MCV1).

RESULTS: Among the 54 African countries studied, 32 (59.3 %) witnessed an overall decrease (slope of change in immunization coverage over time < 0) in immunization coverage, with 16 (29.6 %) experiencing a significant decline (slope of change significantly different from zero ($P < 0.05$)) in coverage. For DTPCV3, 31 countries (57.4 %) demonstrated a decline in coverage, with 12 (22.2 %) being significant declines. Thirty-two countries (59.2 %) reported a decrease in MCV1 coverage over the analysis period, with 17 (31.5 %) significant. Across all three antigens, the IIAG overall score was positively associated with immunization coverage over time. One unit increase in the IIAG score correlated with an average annual increase of 0.64 (95 % CI: 0.35-0.93) percentage points in DTPCV1 coverage, 0.74 percentage points (95 % CI: 0.42-1.07) in DTPCV3 coverage, and 0.60 (95 % CI: 0.30-0.91) percentage points in MCV1 coverage. These findings suggest that an African country with an average IIAG score just one unit higher than their observed average value over the study period, would have achieved a 6.4 %, 7.4 %, and 6.0 % coverage for DTPCV1, DTPCV3, and MCV1, respectively, above its 2021 coverage levels.

CONCLUSION: The Expanded Program on Immunization aspires to reach all eligible populations with life-saving vaccines, regardless of the context. We found that country governance may be an important determinant of immunization performance, potentially explaining the observed stagnation or decline in immunization performance and the heightened vulnerability of immunization programs to external shocks. Understanding the nexus between governance and service delivery suggests that immunization actors, funders, and other stakeholders may need to adjust their expectations of countries' immunization performance accordingly.

WEB: 10.1016/j.vaccine.2024.126293
IMPACT FACTOR: 4.5
CITED HALF-LIFE: 7.9

START COMMENTARY

The Ibrahim Index for African Governance (IIAG) score assesses the quality of governance in African countries, with higher scores indicating better performance. A modified IIAG score was used for this study, consisting of the unweighted average of indicator scores from three of the four pillars (Security and Rule of Law; Participation, Rights and Inclusion; Foundations for Economic Opportunity). Additionally, the countries were categorized by United Nations geographic regions (Eastern, Middle, Northern, Southern, and Western Africa) to account for socioeconomic and political differences between regions. Mean coverage for dose 1 and 3 of a Diphtheria-Tetanus-Pertussis-Containing Vaccine (DTPCV) and first dose of Measles Containing Vaccine (MCV1) increased across quintiles of the IIAG score, and variability of coverage decreased as the IIAG quintiles increased, suggesting that countries with higher IIAG scores tend to have consistently higher and more stable coverage while countries with lower scores have lower coverage but with more variable immunization patterns (Supplementary Figure 4).

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4. [Progress Toward Poliomyelitis Eradication - Pakistan, January 2023-June 2024.](#)

Mbaeyi C, Ul Haq A, Safdar R, Khan Z, Corkum M, Henderson E, et al.

ABSTRACT

Since its launch in 1988, the Global Polio Eradication Initiative has made substantial progress toward the eradication of wild poliovirus (WPV), including eradicating two of the three serotypes, and reducing the countries with ongoing endemic transmission of WPV type 1 (WPV1) to just Afghanistan and Pakistan. Both countries are considered a single epidemiologic block. Despite the occurrence of only a single confirmed WPV1 case during the first half of 2023, Pakistan experienced widespread circulation of WPV1 over the subsequent 12 months, specifically in the historical reservoirs of the cities of Karachi, Peshawar, and Quetta. As of June 30, 2024, eight WPV1 cases had been reported in Pakistan in 2024, compared with six reported during all of 2023. These cases, along with more than 300 WPV1-positive environmental surveillance (sewage) samples reported during 2023-2024, indicate that Pakistan is not on track to interrupt WPV1 transmission. The country's complex sociopolitical and security environment continues to pose formidable challenges to poliovirus elimination. To interrupt WPV1 transmission, sustained political commitment to polio eradication, including increased accountability at all levels, would be vital for the polio program. Efforts to systematically track and vaccinate children who are continually missed during polio vaccination activities should be enhanced by better addressing operational issues and the underlying reasons for community resistance to vaccination and vaccine hesitancy.

START COMMENTARY

Environmental surveillance is conducted through monthly sewage sample testing at 124 sites in Pakistan. The proportion of positive wild poliovirus type 1 environmental samples increased from 3% in 2022 to 5% in 2023 to 22% in 2024. Positive environmental samples were collected in multiple regions, indicating widespread circulation throughout the country (Figure 1). No vaccine-derived poliovirus type 2 cases have been reported in Pakistan since 2021.

FIGURE 1. Reported cases of wild poliovirus type 1 and circulating vaccine-derived poliovirus type 2, by month — Pakistan, January 2019–June 2024
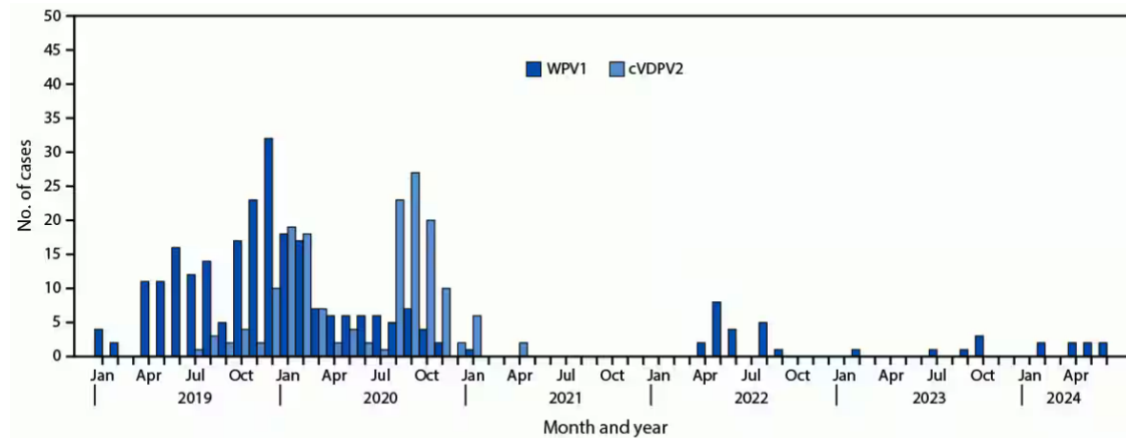
Abbreviations: cVDPV2 = circulating vaccine-derived poliovirus type 2; WPV1 = wild poliovirus type 1.

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5. [Prevalence, spatial distribution and determinants of complete childhood pneumococcal conjugate vaccination in Ethiopia: spatial and multilevel analyses.](#)

Tamir T, Terefe B, Wassie M, Workneh B, Zegeye A.

ABSTRACT

INTRODUCTION: Pneumococcal disease is a serious global public health concern. The primary causative agent of severe illnesses such as pneumonia, meningitis, acute otitis media, and bacteremia is the pneumococcus bacterium. The pneumococcal conjugate vaccine is a key strategy to reduce the burden of pneumococcal disease. Understanding the spatial distribution of complete childhood pneumococcal conjugate vaccine utilization and its associated factors is crucial for designing strategies to improve vaccination implementation. Therefore, this study aimed to determine the spatial distribution of complete childhood pneumococcal conjugate vaccination coverage and identify its determinants in Ethiopia.

METHOD: A spatial and multilevel analysis was conducted using data from the 2019 Ethiopian Mini Demographic and Health Survey. The analysis included a total of 2,055 weighted children. The association between the outcome variable and the explanatory variables was determined by calculating adjusted odds ratios at a 95% confidence interval. Explanatory variables were considered significantly associated with the outcome if the p-value was less than 0.05.

RESULT: The prevalence of complete childhood pneumococcal conjugate vaccination in Ethiopia was 53.94% (95% CI: 51.77, 56.08). Higher complete childhood pneumococcal vaccination coverage was observed in the Addis Ababa, Tigray, Amhara, Benishangul-Gumuz, and Oromia regions, while lower coverage was seen in the Afar, Somali, and SNNPR regions of Ethiopia. Factors significantly associated with complete childhood pneumococcal conjugate vaccination included maternal age, antenatal care visits, place of delivery, region, community women's literacy level, community poverty level, and community antenatal care utilization.

CONCLUSION: The distribution of complete childhood pneumococcal conjugate vaccination exhibited spatial variability across Ethiopia. Approximately half of children aged twelve to thirty-five months received the full dose of the childhood pneumococcal conjugate vaccine in the country. Several factors were identified as statistically significant determinants of complete childhood pneumococcal conjugate vaccination, including maternal age, antenatal care visits, place of delivery, region, community women's literacy level, community poverty level, and community ANC utilization. Therefore, policies and strategies aimed at combating pneumococcal disease should consider these determinants and address areas with low vaccination coverage.

START COMMENTARY

Complete childhood pneumococcal conjugate vaccination coverage was defined as having received three doses of a pneumococcal conjugate vaccine (PCV). Included children were aged 12 to 35 months. Children born to mothers older than 20 years had nearly 2.5 times the odds of vaccination when compared to children born to those aged 15-19 years, and those born to mothers who received antenatal care had >2 times higher odds of vaccination. Optimized hotspot analysis was used to determine the distribution of PCV coverage hot and cold spots within Ethiopia, highlighting regional differences in vaccination coverage (Figure 4).

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6. [Collecting and reporting adverse events in low-income settings-perspectives from vaccine trials in the Gambia.](#)

Bruce A, Umesi A, Bashorun A, Ochoge M, Yisa M, Obayemi-Ajiboye D, et al.

ABSTRACT

BACKGROUND: Despite Africa's significant infectious disease burden, it is underrepresented in global vaccine clinical trials. While this trend is slowly reversing, it is important to recognize and mitigate the challenges that arise when conducting vaccine clinical trials in this environment. These challenges stem from a variety of factors peculiar to the population and may negatively impact adverse event collection and reporting if not properly addressed.

METHODS: As a team of clinical researchers working within the MRCG (Medical Research Council Unit The Gambia), we have conducted 12 phase 1 to 3 vaccine trials over the past 10 years. In this article, we discuss the challenges we face and the strategies we have developed to improve the collection and reporting of adverse events in low-income settings.

OUTCOME: Healthcare-seeking behaviors in the Gambia are influenced by spiritual and cultural beliefs as well as barriers to accessing orthodox healthcare; participants in trials may resort to non-orthodox care, reducing the accuracy of reported adverse events. To address this, trial eligibility criteria prohibit self-treatment and herbal product use during trials. Instead, round-the-clock care is provided to trial participants, facilitating safety follow-up. Constraints in the healthcare system in the Gambia such as limitations in diagnostic tools limit the specificity of diagnosis when reporting adverse events. To overcome these challenges, the Medical Research Council Unit maintains a Clinical Services Department, offering medical care and diagnostic services to study participants. Sociocultural factors, including low literacy rates and social influences, impact adverse event collection. Solicited adverse events are collected during home visits on paper-based or electronic report forms. Community engagement meetings are held before each study starts to inform community stakeholders about the study and answer any questions they may have. These meetings ensure that influential members of the community understand the purpose of the study and the risks and benefits of participating in the trial. This understanding makes them more likely to support participation within their communities.

CONCLUSION: Conducting ethical vaccine clinical trials in resource-limited settings requires strategies to accurately collect and report adverse events. Our experiences from the Gambia offer insights into adverse event collection in these settings.

START COMMENTARY

Table 1 summarizes challenges encountered when collecting adverse events data and describes effective mitigation strategies. While some issues may be specific to the Gambia, many are likely to occur in other low-resource settings. Bruce et al. emphasize the importance of collaborations between researchers, local communities, and research institutions, as implementing these strategies is resource intensive.

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7. Tracking Measles and Rubella Elimination Progress-World Health Organization African Region, 2022-2023.

Masresha B, Wiysonge C, Katsande R, O'Connor P, Lebo E, Perry R.

ABSTRACT

Measles or rubella elimination is verified when endemic transmission of the corresponding virus has been absent for over 36 months in a defined area, in the presence of a well-performing surveillance system. This report updates the progress by 47 countries in the WHO African Region towards the goal of attaining verification of measles and rubella elimination in at least 80% of the countries of the region by 2030. We reviewed the WHO-UNICEF vaccination coverage estimates for the first and second doses of measles- and measles-rubella-containing vaccines, as well as the available coverage data for measles supplementary immunization activities, during 2022-2023. We also reviewed the measles-surveillance performance and analyzed the epidemiological trends of measles and rubella as reported in the case-based surveillance database. The WHO-UNICEF estimates of first measles vaccine dose (MCV1) and second measles vaccine dose (MCV2) coverage for the African Region for 2022 were 69% and 45%, respectively. Rubella-containing vaccines have been introduced in the routine immunization program in 32 of 47 (68%) countries as of the end of 2022, with no introductions during 2023. In 2022 and 2023, a total of 144,767,764 children were vaccinated in the region with measles or MR vaccines in 24 countries through 32 mass vaccination campaigns. The administrative coverage target of 95% was reached in only 15 (49%) of the 32 vaccination campaigns. In 2023, a total of 125,957 suspected cases of measles were reported through the case-based surveillance system, and 73,625 cases (58%) were confirmed to be measles, either by laboratory testing, by epidemiological linkage, or based on clinical compatibility. A total of 4805 confirmed rubella cases were reported, though this total represents substantial under-ascertainment. The regional incidence of measles was 60.3 cases per million population. Twenty-six countries (55%) met the targets for the two principal surveillance system performance-monitoring indicators. No country in the region has attained the verification of measles or rubella elimination as of the end of 2023. Addressing systemic problems with routine immunization and using tailored approaches to reach unvaccinated children can contribute to progress towards measles and rubella elimination. In addition, periodic and timely high-quality preventive SIAs remain a critical programmatic strategy to reach unvaccinated children.

START COMMENTARY

Estimated coverage of second dose of measles containing vaccine (MCV2) increased from 41% in 2021 to 45% in 2022. Of the 41 countries with MCV2 coverage estimates, only Seychelles has attained >95% coverage while 9 countries have dropout rates from MCV1 to MCV2 of 20% or more (Figure 1). Twelve Gavi-eligible countries have not yet reached the 80% measles vaccination coverage requirement to receive support to introduce a rubella-containing vaccine.

Figure 1. Measles first dose coverage and drop-out rates by country. African Region, 2022.
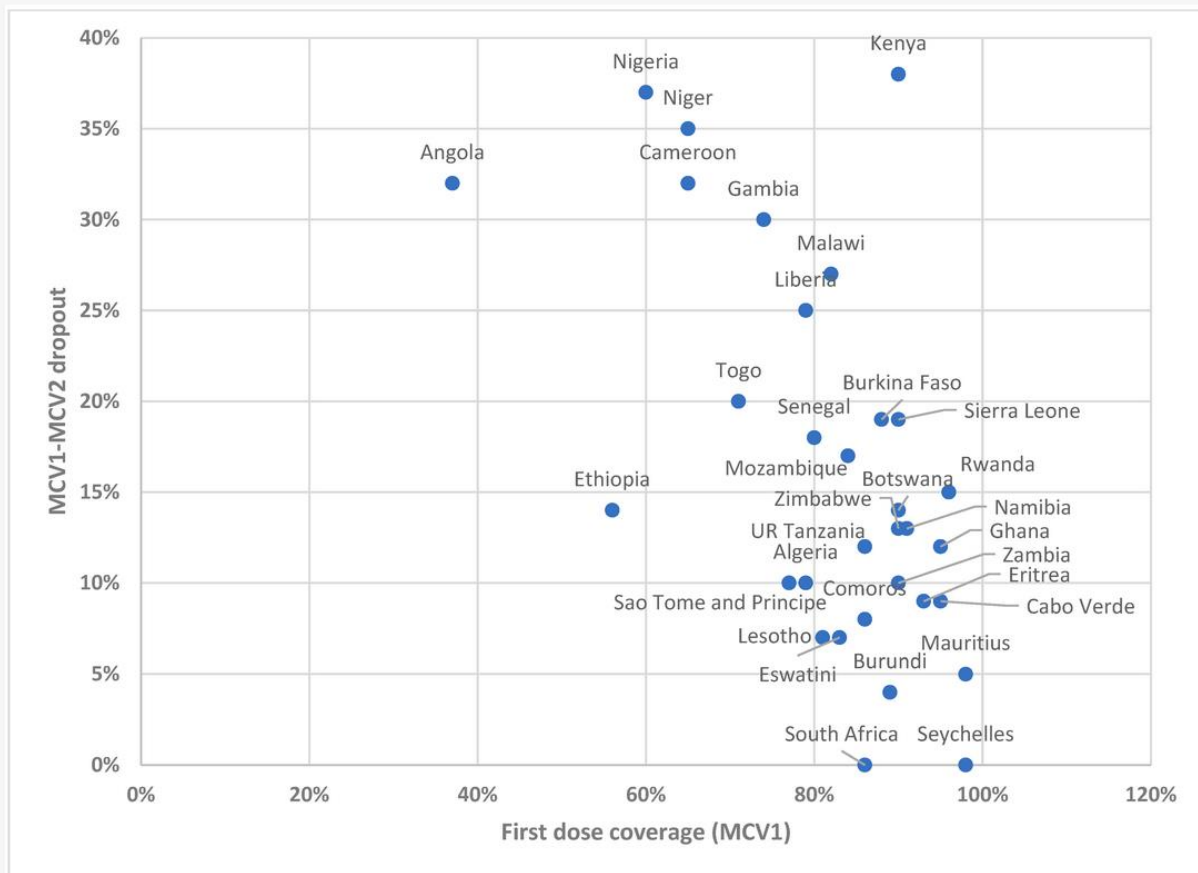
8. Measles Population Immunity Profiles: Updated Methods and Tools.

Li X, Goodson J, Perry R.

ABSTRACT

Measles is a highly contagious disease and remains a major cause of child mortality worldwide. While measles vaccine is highly effective, high levels of population immunity are needed to prevent outbreaks. Simple but accurate tools are needed to estimate the profile of population measles immunity by age to identify and fill immunity gaps caused by low levels of vaccination coverage. The measles immunity profile estimates and visualizes the percentage of each birth cohort immune or susceptible to measles based on measles vaccination coverage. Several tools that employed this approach have been developed in the past, including informal unpublished versions. However, these tools used varying assumptions and produced inconsistent results. We updated the measles population immunity profile methodology to standardize and better document the assumptions and methods; provide timely estimates of measles population immunity; and facilitate prompt actions to close immunity gaps and prevent outbreaks. We recommend assuming that the second dose of the measles-containing vaccine (MCV2) and doses given during supplementary immunization activities (SIAs) first reach children who have been previously vaccinated against measles, so that previously unvaccinated children are reached only when the coverage of MCV2 or SIA is higher than the coverage achieved by all previous measles vaccination opportunities. This updated method provides a conservative estimate of immunization program impact to assess measles outbreak risk and to facilitate early planning of timely preventive SIAs to close population immunity gaps.

WEB: 10.3390/vaccines12080937
IMPACT FACTOR: 5.2
CITED HALF-LIFE: 2.2

START COMMENTARY

The updated tools to estimate the measles immunity population profile include both an Excel version and an R version, allowing for use by those with different software skills. More granular analyses that reflect the timing of vaccination opportunities and age-specific supplementary immunization activity (SIA) vaccine efficacy are possible in R, therefore the R tool estimates are generally more accurate than the Excel tool. Model assumptions and methods are found in Table 1. Natural immunity acquired through infection is not included, and immunity profiles do not account for geographic variations in routine immunization within countries.

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9. [Evaluation of interventions to improve timely hepatitis B birth dose vaccination among infants and maternal tetanus vaccination among pregnant women in Nigeria.](#)

Kanu F, Freeland C, Nwokoro U, Mohammed Y, Ikwe H, Uba B, et al.

ABSTRACT

BACKGROUND: Nigeria has the largest number of children infected with hepatitis B virus (HBV) globally and has not yet achieved maternal and neonatal tetanus elimination. In Nigeria, maternal tetanus diphtheria (Td) vaccination is part of antenatal care and hepatitis B birth dose (HepB-BD) vaccination for newborns has been offered since 2004. We implemented interventions targeting healthcare workers (HCWs), community volunteers, and pregnant women attending antenatal care with the goal of improving timely (within 24 hours) HepB-BD vaccination among newborns and Td vaccination coverage among pregnant women.

METHODS: We selected 80 public health facilities in Adamawa and Enugu states, with half intervention facilities and half control. Interventions included HCW and community volunteer trainings, engagement of pregnant women, and supportive supervision at facilities. Timely HepB-BD coverage and at least two doses of Td (Td2+) coverage were assessed at baseline before project implementation (January-June 2021) and at endline, one year after implementation (January-June 2022). We held focus group discussions at intervention facilities to discuss intervention strengths, challenges, and improvement opportunities.

RESULTS: Compared to baseline, endline median vaccination coverage increased for timely HepB-BD from 2.6% to 61.8% and for Td2+ from 20.4% to 26.9% in intervention facilities (p < 0.05). In comparison, at endline in control facilities median vaccination coverage for timely HepB-BD was 7.9% (p < 0.0001) and Td2+ coverage was 22.2% (p = 0.14). Focus group discussions revealed that HCWs felt empowered to administer vaccination due to increased knowledge on hepatitis B and tetanus, pregnant women had increased knowledge that led to improved health seeking behaviors including Td vaccination, and transportation support was needed to reach those in far communities.

CONCLUSION: Targeted interventions significantly increased timely HepB-BD and Td vaccination rates in intervention facilities. Continued support of these successful interventions could help Nigeria reach hepatitis B and maternal and neonatal tetanus elimination goals.

START COMMENTARY

The healthcare worker training intervention included 16 hours of training on the burden of hepatitis B and maternal and neonatal tetanus, vaccine and data management, and caregiver communication techniques. Community volunteers received 8 hours of training on how to create line lists of pregnant women and newborns, connect pregnant women to antenatal care clinics, and educate women on the importance of maternal and birth dose vaccines. A supervisory team visited intervention facilities throughout the intervention period to track implementation progress. Authors suggest revising the national hepatitis B vaccination guidance in Nigeria to specify the importance of timely administration of the birth dose since they found many healthcare workers were unaware that the vaccine is most effective in preventing mother to child transmission of hepatitis B when given as soon as possible after birth.

10. ‘Health Camp' model: a unique approach for child vaccination in non-state armed actor controlled, inaccessible geographies in Somalia.

Kahow M, Halane S, Ali A, Shah R.

ABSTRACT

Decades of conflict, political instability, and limited infrastructure left Somalia facing significant challenges to offer consistent and equitable health services, especially for child vaccination. Recent data reveals alarming vaccination gaps, with 60% of children receiving no vaccinations, and only 11% completing required vaccines. Despite global support, an estimated 1.15 million children remain unvaccinated, half of them reside in inaccessible areas controlled by non-state armed actors. In this context, the Far-Reaching Integrated Delivery (FARID) project was initiated since October 2022 across 10 districts of Galmudug and Hirshabelle state in Somalia. Employing the 'Health Camp' model, FARID addresses social, structural, and gender barriers, adapting to ever-changing context of inaccessible regions by providing mobile health facilities and outreach health and nutrition services, including child vaccination. This approach effectively reached previously unreached population in Somalia's most difficult-to-reach areas. Implemented in phases, the project immunized 51,168 children (0-23 months) who had not received any prior vaccinations (23,753 boys and 27,415 girls), screened and treated 14,158 malnourished children (0-59 months) and vaccinated 11,672 pregnant women during March-December 2023. The project's success hinges on intensive community engagement, local partnerships, innovation in mapping and data management, and delivery of integrated services tailored to population needs. The project underscores the critical role of local community-based organizations and clan elders in reaching inaccessible populations through humanitarian negotiation amidst security challenges. The project has achieved significant milestones aligned with national health strategic plans, including progress towards universal health coverage and improved immunization access in Somalia's most challenging regions.

START COMMENTARY

Health camps are mobile health facilities that provided basic health care, mainly for maternal health, vaccination, and nutrition. Primary health care provided through the health camp program in 10 districts in Somalia built community trust and increased demand for vaccination services. Partnering with community organizations was key to reaching inaccessible populations, and engaging clan elders was critical for project planning, implementation, and monitoring.

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11. [Mapping the existing body of knowledge on new and repurposed TB vaccine implementation: A scoping review.](#)

ABSTRACT

There is global consensus on the urgent need for a safe and effective TB vaccine for adults and adolescents to improve global TB control, and encouragingly, several promising candidates have advanced to late-stage trials. Significant gaps remain in understanding the critical factors that will facilitate the successful implementation of new and repurposed TB vaccines in low- and middle-income countries (LMICs), once available. By synthesizing the existing body of knowledge, this review offers comprehensive insights into the current state of research on implementation of these adult and adolescent vaccines. This review explores four key dimensions: (1) epidemiological impact, (2) costing, cost-effectiveness, and/or economic impact, (3) acceptability, and the (4) feasibility of implementation; this includes implementation strategies of target populations, and health system capabilities. Results indicate that current research primarily consists of epidemiological and costing/cost-effectiveness/economic studies in India, China, and South Africa, mainly modelling with M72/AS01, BCG revaccination, and hypothetical vaccines. Varying endpoints, vaccine efficacies, and vaccination coverages were used. Globally, new, and repurposed TB vaccines are estimated to save millions of lives. Economically, these vaccines also demonstrate promise with expected cost-effectiveness in most countries. Projected outcomes were dependent on vaccine characteristics, target population, implementation strategy, timing of roll out, TB burden/country context, and vaccination coverage. Potential barriers for vaccine acceptability included TB-related stigma, need for a second dose, and cost, while low pricing, community and civil society engagement and heightened public TB awareness were potential enablers in China, India, and South Africa. Potential implementation strategies considered spanned from mass campaigns to integration within existing vaccine programs and the primary target group studied was the general population, and adults and adolescents. In conclusion, future research must have broader geographical representations to better understand what is needed to inform tailored vaccine programs to accommodate diverse country contexts and population groups to achieve optimal implementation and impact. Furthermore, this review underscores the scarcity of research on acceptability of new and repurposed TB vaccines and their delivery among potential beneficiaries, the most promising implementation strategies, and the health system capabilities necessary for implementation. The absence of this knowledge in these areas emphasizes the crucial need for future research to ensure effective TB vaccine implementation in high burden settings worldwide.

START COMMENTARY

This scoping review included 23 articles, with most focused on India (9 studies), South Africa (7 studies), and China (6 studies). Impact of new and repurposed TB vaccines on health outcomes was estimated in 16 studies (Table 2) while 11 investigated costing, cost-effectiveness, or economic implications (Table 3). Only one study assessed acceptability of a new or repurposed TB vaccination and described expert opinions of barriers and facilitators to vaccine uptake in India, China, and South Africa. Five included studies discussed implementation strategies and feasibility and two described health system readiness.

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12. [An evaluation of a multi-partner approach to increase routine immunization coverage in six northern Nigerian States.](#)

Dougherty L, Adediran M, Akinola A, Alabi M, Etim E, Ohioghame J, et al.

ABSTRACT

BACKGROUND: Global health partnerships are increasingly being used to improve coordination, strengthen health systems, and incentivize government commitment for public health programs. From 2012 to 2022, the Bill & Melinda Gates Foundation (BMGF) and Aliko Dangote Foundation (ADF) forged Memorandum of Understanding (MoU) partnership agreements with six northern state governments to strengthen routine immunization (RI) systems and sustainably increase immunization coverage. This mixed methods evaluation describes the RI MoUs contribution to improving program performance, strengthening capacity and government financial commitment as well as towards increasing immunization coverage.

METHODS: Drawing from stakeholder interviews and a desk review, we describe the MoU inputs and processes and adherence to design. We assess the extent to which the program achieved its objectives as well as the benefits and challenges by drawing from a health facility assessment, client exit interview and qualitative interviews with service providers, community leaders and program participants. Finally, we assess the overall impact of the MoU by evaluating trends in immunization coverage rates.

RESULTS: We found the RI MoUs across the six states to be mostly successful in strengthening health systems, improving accountability and coordination, and increasing the utilization of services and financing for RI. Across all six states, pentavalent 3 vaccine coverage increased from 2011 to 2021 and in some states, the gains were substantial. For example, in Yobe, vaccination coverage increased from 10% in 2011 to nearly 60% in 2021. However, in Sokoto, the change was minimal increasing from only 4% in 2011 to nearly 8% in 2021. However, evaluation findings indicate that issues pertaining to human resources for health, insecurity that inhibits supportive supervision and vaccine logistics as well as harmful socio-cultural norms remain a persistent challenge in the states. There is also a need for a rigorous monitoring and evaluation plan with well-defined measures collected prior to and throughout implementation.

CONCLUSION: Introducing a multi-partner approach grounded in a MoU agreement provides a promising approach to addressing health system challenges that confront RI programs.

START COMMENTARY

The Routine Immunization (RI) Memorandum of Understanding (MoU) logic model is outlined in Figure 1. Inputs identified are to: 1) provide funding for RI programs, 2) improve political will and high-level engagement, and 3) provide technical assistance for the implementation program. The process focuses on governance, financial management, vaccine supply chains, service delivery, monitoring and evaluation and community engagement. Outputs and intermediate outcomes are outlined, with sustained increase in immunization coverage as the primary goal.

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13. [Effectiveness and impact of monovalent rotavirus vaccination in Afghanistan: a test-negative case-control analysis.](#)

Anwari P, Burnett E, Safi N, Samsor A, Safi H, Chavers T, et al.

ABSTRACT

BACKGROUND: Afghanistan introduced monovalent rotavirus vaccine (Rotarix) into its national immunisation schedule in January, 2018. While post-licensure studies have shown substantial declines in rotavirus gastroenteritis cases and deaths globally, there is little evidence of rotavirus vaccine effectiveness and impact from low-income countries in Asia. We aimed to evaluate the effectiveness of the Rotarix vaccine and the impact of Rotarix vaccine on rotavirus gastroenteritis hospitalisations (ie, hospital admissions) among children younger than 5 years in Afghanistan.

METHODS: We used a test-negative case-control design embedded in an active sentinel surveillance platform to evaluate vaccine effectiveness. Children born on or after Jan 1, 2018, who had documentation of their rotavirus vaccination status and who were admitted for acute gastroenteritis at one of four sentinel hospitals from May, 2018 to December, 2021 were eligible to be included. We used an unconditional logistic regression model to estimate vaccine effectiveness and 95% CIs for a complete series of doses compared with no rotavirus vaccine doses among patients admitted with acute gastroenteritis. Vaccine effectiveness against hospitalisation was calculated as (1 - [odds of being vaccinated in cases] / [odds of being vaccinated in controls]) × 100%. We compared pre-vaccine (2013-15) and post-vaccine (2019-21) surveillance data from two sites to calculate vaccine impact.

FINDINGS: The vaccine effectiveness analysis included 1172 cases and 2173 controls. Approximately 2108 (63·0%) of 3345 cases and controls were male, 1237 (37·0%) were female, and 2171 (65·0%) were aged 6-11 months. Two doses of Rotarix were 45% (95% CI 22-62) effective against rotavirus hospitalisation in children aged 6-59 months, adjusting for age, severity, admission year, and rotavirus season. Rotavirus positivity decreased from 51% pre-vaccine to 39% post-vaccine, resulting in a 39% adjusted reduction in rotavirus positivity among children younger than 5 years admitted with acute gastroenteritis.

INTERPRETATION: Rotarix showed moderate effectiveness in preventing rotavirus gastroenteritis hospitalisations, consistent with findings in other low-income countries. These findings support the continued administration of the rotavirus vaccine in Afghanistan.

FUNDING: Gavi, the Vaccine Alliance.

START COMMENTARY

Rotavirus disease burden was found to be highest among those aged 6-11 months; rotavirus vaccine effectiveness in this key age group was higher than overall effectiveness (57% vs 45%). Estimated vaccine effectiveness was 18 times higher among children who did not have stunting compared to those with stunting. Afghanistan has a high prevalence of malnutrition and stunted growth, which contribute to the observed low vaccine effectiveness observed compared to high-income settings. The difference between observed and expected hospitalizations for gastroenteritis among children aged 6-59 months can be seen in Figure 3A. Little difference was found in outpatient visits for gastroenteritis after vaccine introduction (Figure 3B), likely because rotavirus vaccine is less effective against mild disease.

Figure 3: All-cause acute gastroenteritis hospital admissions (A) and outpatient visits (B) before (2013–17) and after rotavirus vaccine introduction (2018–22)
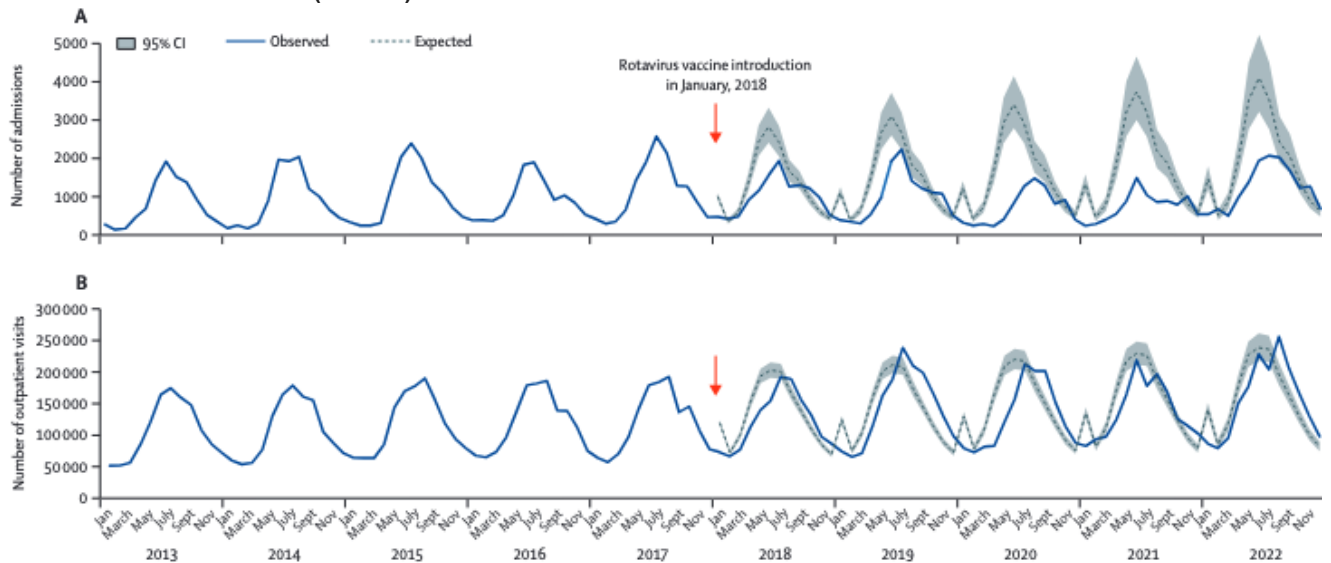
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14. [Re-evaluating the impact and cost-effectiveness of pneumococcal conjugate vaccine introduction in 112 low-income and middle-income countries in children younger than 5 years: a modelling study.](#)

Chen C, Ang G, Akksilp K, Koh J, Scott J, Clark A, et al.

Lancet Glob Health. 2024 Aug 16;12(9):e1485-e1497.

PubMed ID: 39151983

ABSTRACT

BACKGROUND: Streptococcus pneumoniae has been estimated to cause 9·18 million cases of pneumococcal pneumonia, meningitis, and invasive non-pneumonia non-meningitis disease and 318 000 deaths among children younger than 5 years in 2015. We estimated the potential impact and cost-effectiveness of pneumococcal conjugate vaccine (PCV) introduction.

METHODS: We updated our existing pseudodynamic model to estimate the impact of 13-valent PCV (PCV13) in 112 low-income and middle-income countries by adapting our previously published pseudodynamic model with new country-specific evidence on vaccine coverage, burden, and post-introduction vaccine impact from WHO-UNICEF estimates of national immunisation coverage and a global burden study. Deaths, disability-adjusted life-years (DALYs), and cases averted were estimated for children younger than 5 years born between 2000 and 2030. We used specific PCV coverage in each country and a hypothetical scenario in which coverage increased to diphtheria-tetanus-pertussis (DTP) levels. We conducted probabilistic uncertainty analyses.

FINDINGS: Using specific vaccine coverage in countries, we estimated that PCV13 could prevent 697 000 (95% credibility interval 359 000-1 040 000) deaths, 46·0 (24·0-68·9) million DALYs, and 131 (89·0-172) million cases in 112 countries between 2000 and 2030. PCV was estimated to prevent 5·3% of pneumococcal deaths in children younger than 5 years during 2000-30. The incremental cost of vaccination would be I$851 (510-1530) per DALY averted. If PCV coverage were increased to DTP coverage in 2020, PCV13 could prevent an additional 146 000 (75 500-219 000) deaths.

INTERPRETATION: The inclusion of real-world evidence from lower-income settings revealed that delays in PCV roll-out globally and low PCV coverage have cost many lives. Countries with delays in vaccine introduction or low vaccine coverage have experienced many PCV-preventable deaths. These findings underscore the importance of rapidly scaling up PCV to achieve high coverage and maximise vaccine impact.

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

START COMMENTARY

Estimated disability-adjusted life-years (DALYs) averted due to pneumococcal conjugate vaccine between 2000 and 2030 were greatest in Africa (Figure 1A). The model does not account for reduction in cases, deaths, and DALYs among older age groups due to herd immunity as only the impact on children under 5 years was included. The analysis assumed uniform vaccination coverage for each country, which may impact accuracy of estimates in countries with varying regional vaccination coverage.

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15. [Long-term impact of rotavirus vaccination on all-cause and rotavirus-specific gastroenteritis and strain distribution in Central Kenya: An 11-year interrupted time-series analysis.](#)

ABSTRACT

BACKGROUND: Kenya introduced a monovalent rotavirus vaccine administered orally at 6 and 10 weeks of age into her National Immunization Program in July 2014. The study evaluated the long-term impact of the vaccine on hospitalization for all-cause and rotavirus-specific acute gastroenteritis (AGE) and strain epidemiology in Kenya.

METHODS: Data on all-cause and rotavirus-specific AGE and strain distribution were derived from an eleven-year hospital-based surveillance of AGE among children aged <5 years at Kiambu County Teaching and Referral Hospital (KCTRH) in Central Kenya between 2009 and 2020. Fecal samples were screened for group A rotavirus using ELISA and genotyped using multiplex semi-nested RT-PCR. Trends in all-cause and rotavirus-related AGE and strain distribution were compared between the pre-vaccine (July 2009-June 2014), early post-vaccine (July 2014-June 2016) and late post-vaccine (February 2019-October 2020) periods.

RESULTS: Rotavirus-specific AGE was detected at 27.5% (429/1546, 95% CI: 25.5-30.1%) in the pre-vaccine period; 13.8% (91/658, 95% CI: 11.3-16.6%) in the early post-vaccine period (July 2014-June 2016); and 12.0% (229/1916, 95% CI: 10.6-13.5%) in the late post-vaccine period (February 2019-October 2020). This amounted to a decline of 49.8% (95% CI: 34.6%-63.7%) in rotavirus-specific AGE in the early post-vaccine period and 53.4% (95% CI: 41.5-70.3%) in the late post-vaccine period when compared to the pre-vaccine period. All-cause AGE hospitalizations declined by 40.2% (95% CI: 30.8%-50.2%) and 75.3% (95% CI: 65.9-83.1%) in the early post-vaccine and late post-vaccine periods, respectively, when compared to the pre-vaccine period. G3P [8] was the predominant strain in the late post-vaccine period, replacing G1P[8] which had predominated in the pre-vaccine and early post-vaccine periods. Additionally, we detected considerable proportions of uncommon strains G3P[6] (4.8%) and G12P[6] (3.5%) in the post-vaccine era.

CONCLUSION: Rotavirus vaccination has resulted in a significant decline in all-cause and rotavirus-specific AGE, and thus, provides strong evidence for public health policy makers in Kenya to support the sustained use of the rotavirus vaccine in routine immunization. However, the shift in strain dominance and age distribution of rotavirus AGE in the post-vaccine era underscores the need for

continued surveillance to assess any possible vaccine-induced selective pressure that could diminish the vaccine effectiveness over time.

START COMMENTARY

Rotavirus vaccine coverage in Kiambu County between 2014 and 2020 was estimated at 96% and 83% for dose 1 and 2, respectively, but coverage decreased between 2019 and 2020 (Figure 2). The highest proportion of rotavirus-specific acute gastroenteritis (AGE) appears to have shifted from those in the 6-8 month range prior to vaccine introduction to those 12-23 months in the early post-vaccine period (2014-2016), then to those 24-59 months in the late post-vaccine period (2019-2020) (Table 2). This shift may be due to waning immunity.

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Additional Articles of Interest

1   A perspective on the novel pentavalent Men5CV (NmCV-5) meningitis vaccine and Nigeria's pioneering rollout campaign. {Full Article}

2   Human papilloma virus vaccination in the resource-limited settings of sub-Saharan Africa: Challenges and recommendations. {Full Article}

3   Invasive Pneumococcal Infections Among Moroccan Children: Pneumococcal Vaccination Challenges in the Mature Vaccine Era. {Full Article}

4   Human papillomavirus (HPV) vaccination in a privately funded program in Ghana: A qualitative case study. {Full Article}

5   Analyzing the usage of theories of change for routine immunization programs – a review of impact evaluations from LMICs. {Full Article}

6   Time interval distribution of hepatitis B vaccine immunization among infants in China from 2017 to 2021. {Full Article}

7   Discrediting health disinformation sources: Advantages of highlighting low expertise. {Full Article}

8   Timeliness for vaccination according to the expanded immunization program in children under 6 years of age in Colombia between 2014 and 2019. {Full Article}

9   Impact of vaccination against Japanese encephalitis in endemic countries. {Full Article}

10 Identifying vulnerabilities in essential health services: Analysing the effects of system shocks on childhood vaccination delivery in Lebanon. {Full Article}

11 Constructing vaccination slogans in the late stage of vaccine launch: an experimental study based on the framing effect theory. {Full Article}

12 Vaccination Coverage and Predictors of Vaccination among Children Aged 12-23 Months in the Pastoralist Communities of Ethiopia: A Mixed Methods Design. {Full Article}

13 Understanding Socioeconomic Inequalities in Zero-Dose Children for Vaccination in Underserved Settings of Ethiopia: Decomposition Analysis Approach. {Full Article}

14 Using matrix assisted laser desorption ionisation mass spectrometry combined with machine learning for vaccine authenticity screening. {Full Article}

15 Coping mechanisms and strategies adopted to improve the quality and timeliness of immunization data among lower-level private-for-profit service providers in Kampala Capital City, Uganda. {Full Article}

16 Comparison of the sensitivity and specificity of commercial anti-dengue virus IgG tests to identify persons eligible for dengue vaccination. {Full Article}

17 Determinants of timely administration of the birth dose of hepatitis B vaccine in Senegal in 2019: Secondary analysis of the demographic and health survey. {Full Article}

18 Estimating time-varying cholera transmission and oral cholera vaccine effectiveness in Haiti and Cameroon, 2021-2023. {Full Article}

19 A Global Industry Survey on Post-Approval Change Management and Use of Reliance. {Full Article}

20 Role of the dengue vaccine TAK-003 in an outbreak response: Modeling the Sri Lanka experience. {Full Article}

21 Financing pandemic prevention, preparedness and response: lessons learned and perspectives for future. {Full Article}

22 Yellow fever vaccine coverage and associated factors among under-five children in Kenya: Data from Kenyan Demographic and Health Survey 2022. {Full Article}

23 Geographic information system and information visualization capacity building: Successful polio eradication and current and future challenges in the COVID-19 era for the World Health Organization's African region. {Full Article}

Appendix

The literature search for the October 2024 Vaccine Delivery Research Digest was conducted on September 22, 2024. We searched English language articles indexed by the US National Library of Medicine and published between August 15, 2024 and September 14, 2024. The search resulted in 414 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 2024/08/15:2024/09/14[Date - Publication]