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FEBRUARY 2022

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1. Determinants of maternal influenza vaccination in the context of low- and middle-income countries: A systematic review.

Raut S, Apte A, Srinivasan M, Dudeja N, Dayma G, Sinha B, et al.

PLoS One. 2022 Jan 29;17(1):e0262871.
PubMed ID: 35081138

ABSTRACT

BACKGROUND: Pregnancy and early infancy are considered to be the vulnerable phases for severe influenza infection causing morbidity and mortality. Despite WHO recommendations, influenza is not included in the immunization programs of many low- and middle-income countries. This systematic review is aimed at identifying barriers and facilitators for maternal influenza vaccination amongst the perinatal women and their health care providers in low- and middle-income countries.

METHODS: We selected 11 studies from the 1669 records identified from PubMed, CABI, EMBASE and Global Health databases. Studies related to both pandemic and routine influenza vaccination and studies conducted amongst women in the antenatal as well as postnatal period were included. Both qualitative, quantitative, cross-sectional and interventional studies were included.

RESULTS: Knowledge about influenza disease, perception of the disease severity during pregnancy and risk to the foetus/newborn and perceived benefits of influenza vaccination during pregnancy were associated with increased uptake of influenza vaccination during pregnancy. Recommendation by health care provider, vaccination in previous pregnancy and availability of vaccine in public health system facilitated vaccine uptake. High parity, higher education, vaccination in the later months of pregnancy, less than 4 antenatal visits, concerns about vaccine safety and negative publicity in media were identified as barriers for influenza vaccination. Lack of government recommendation, concerns about safety and effectiveness and distrust in manufacturer were the barriers for the healthcare providers to recommend vaccination.

CONCLUSION: While availability of influenza vaccine in public health system can be a key to the success of vaccine implementation program, increasing the awareness about need and benefits of maternal influenza vaccination amongst pregnant women as well as their health care providers is crucial to improve the acceptance of maternal influenza vaccination in low and middle-income countries.

WEB: 10.1371/journal.pone.0262871
IMPACT FACTOR: 2.740
CITED HALF-LIFE: 5.6

START COMMENTARY

In this systematic review, Raut *et al.* summarize barriers and facilitators for maternal influenza vaccination for perinatal women and healthcare providers (HCPs) in low- and middle-income countries (LMICs). This systematic review makes an important contribution as pregnant women are particularly vulnerable to severe influenza infection but have low uptake of the vaccine, which is rarely included in immunization programs in LMICs. Inclusion criteria for the systematic review were: 1) published before December 31, 2020; 2) assessing uptake of maternal vaccination, knowledge, attitudes, and perceptions in pregnant women or healthcare providers; 3) all types of immunization (pandemic immunization and routine); 4) all study types (quantitative, qualitative, cross-sectional, interventional); and 5) antenatal or postnatal period. Raul *et al.* excluded studies which focused on vaccine efficacy or took place in high income countries.

Overall, 11 studies across 13 countries were included. Most (7 of 11 studies) were cross-sectional, while the remaining used mixed-methods or qualitative methods. Nearly all studies (10) included pregnant or recently pregnant women, and three included HCPs. Three studies (one in Peru, two in Nicaragua) had widely available influenza vaccine for pregnant women and assessed factors affecting uptake. All other studies assessed determinants associated with willingness to receive maternal influenza vaccine. Studies evaluating actual uptake reported a range between 19-71%, and studies evaluating willingness to receive the vaccine reported acceptance rates of 45-98.5%. *Table 4* summarizes barriers to maternal influenza as perceived by pregnant women and healthcare providers. Among pregnant women, the most common cited barriers were safety concerns for self, distrust for the vaccine, non-availability, the vaccine not being offered by HCPs, and not being aware of the vaccine or its necessity. Among HCPs, the most common barriers were safety concerns about the vaccine and distrust of the vaccine and manufacturer. Raut *et al.* used quantitative studies to calculate odds ratios of vaccine acceptance and found the following factors to be significantly associated with increased odds of vaccine acceptance among pregnant women: knowledge of influenza disease (Odds Ratio [OR]: 24.48); perceived risk of influenza disease during pregnancy (OR: 2.38); vaccine recommendation for HCP (OR range: 2.5-74), recommendation by government bodies (OR: 3.52). Overall, this study underscores the importance of addressing determinants related to the knowledge of disease and vaccine, the healthcare providers and system, and family, community, and media to increase levels of maternal influenza awareness, acceptance, and uptake in LMICs.

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2. Expert Views on COVAX and Equitable Global Access to COVID-19 Vaccines.

Manriquez Roa T, Holzer F, Luna F, Biller-Andorno N.

Int J Public Health. 2022 Jan 18;66:1604236.
PubMed ID: 35035347

ABSTRACT

Objectives: We face the impossibility of having enough COVID-19 vaccines for everyone in the near future. This study aims to contribute to the debate on equitable global access to COVID-19 vaccines, tackling key ethical discussions and policy challenges regarding early phases of COVAX, the global cooperation mechanism for supporting fair vaccine allocation. Methods: We conducted in-depth interviews with twelve experts and a literature research on academic articles, media sources and public statements. We built a data analysis matrix and conducted a thematic analysis. Results: Our findings show, first, that interviewed experts who hold different views on vaccine allocation, including moderate nationalist perspectives, agree on joining a global cooperation mechanism. Second, incentives to join COVAX vary greatly among countries. Third, specific barriers to COVAX emerged in the early implementation phase. And fourth, countries might be trapped in a zero-sum game regarding the global vaccine supply. Conclusion: We present findings that enrich analyses of early phases of COVAX (April 2020-21), we introduce three ethical discussions that provide a common ground for equitable access to COVID-19 vaccines, and we highlight policy challenges.

WEB: 10.3389/ijph.2021.1604236
IMPACT FACTOR: 3.380
CITED HALF-LIFE: 6.1

START COMMENTARY

In this qualitative study, Manriquez Roa *et al.* summarize findings related to equitable global access to COVID-19 vaccines from in-depth interviews (IDIs) with 12 vaccine experts and a literature review. This article makes an important contribution as it covers two key aspects (policy challenges and ethical issues) of COVAX, which can inform future efforts to ensure equity and improve access. A literature review of academic literature, media reports, and public statements was conducted to establish criteria for the selection of experts, guide the design of the interview guide, and triangulate findings from interviews. IDIs were conducted between January and March 2021 with country and global experts in academia, government (e.g., Ministries of Health), and international health organizations across Europe, Latin America, and Asia (details about participants are shown in *Table 1*). A notable limitation of this study is that it does not have global representation (i.e., from Africa). IDIs focused on the design, relevance, incentives, and implementation of COVAX. Other topics

included vaccine development and production and challenges associated with equitable access to vaccines.

Overall, Manriquez Roa *et al.* describe positive views on the COVAX scheme, which experts described as 'the best cooperative scheme that has been achieved in history of global vaccine distribution'. Experts stated that it enables cost-sharing, increases access to vaccines in LMICs, and creates greater transparency of vaccine safety and effectiveness. Incentives mentioned for joining COVAX included increased access to safe and effective vaccines, promotion of countries foreign health policy (e.g., a representative from Norway stated that joining COVAX maintained its position as a leading country in global health and as an important funder of Gavi), and increased biosecurity, as it aids in reducing virus circulation and mutations. Despite these positive findings, there were several implementation challenges in the early phases of COVAX. Experts described issues with funding, vaccine production (including technology transfer and intellectual property), issues with multilateralism, disagreements about distribution, and the lack of other vaccines offered aside from COVID-19. Experts stated that there was uncertainty and a lack of transparency if the current funding is sufficient to deliver the intended vaccines (2 billion in 2021). Additionally, experts mentioned that improved technology transferred is required for vaccines to be produced to meet global needs. However, experts held differing views on waivers of intellectual property rights. Some stated that they did not believe that there was a truly multilateral approach to vaccine distribution with COVAX, given there is competition between COVAX and rich countries for COVID-19 vaccines which could be prevented. Overall, this study describes issues which have led to limited success of COVAX, which has had only 330 million COVID-19 vaccines shipped in 2021, substantially lower than the 2 billion goal. By addressing some of the key challenges raised, COVAX can more successfully ensure global vaccine equity.

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3. Impact of health system strengthening on delivery strategies to improve child immunisation coverage and inequalities in rural Madagascar.

Rajaonarifara E, Bonds M, Miller A, Ihantamalala F, Cordier L, Razafinjato B, et al.

BMJ Glob Health. 2022 Jan 27;7(1).

PubMed ID: 35012969

ABSTRACT

BACKGROUND: To reach global immunisation goals, national programmes need to balance routine immunisation at health facilities with vaccination campaigns and other outreach activities (eg, vaccination weeks), which boost coverage at particular times and help reduce geographical inequalities. However, where routine immunisation is weak, an over-reliance on vaccination campaigns may lead to heterogeneous coverage. Here, we assessed the impact of a health system strengthening (HSS) intervention on the relative contribution of routine immunisation and outreach activities to reach immunisation goals in rural Madagascar.

METHODS: We obtained data from health centres in Ifanadiana district on the monthly number of recommended vaccines (BCG, measles, diphtheria, tetanus and pertussis (DTP) and polio) delivered to children, during 2014-2018. We also analysed data from a district-representative cohort carried out every 2 years in over 1500 households in 2014-2018. We compared changes inside and outside the HSS catchment in the delivery of recommended vaccines, population-level vaccination coverage, geographical and economic inequalities in coverage, and timeliness of vaccination. The impact of HSS was quantified via mixed-effects logistic regressions.

RESULTS: The HSS intervention was associated with a significant increase in immunisation rates (OR between 1.22 for measles and 1.49 for DTP), which diminished over time. Outreach activities were associated with a doubling in immunisation rates, but their effect was smaller in the HSS catchment. Analysis of cohort data revealed that HSS was associated with higher vaccination coverage (OR between 1.18 per year of HSS for measles and 1.43 for BCG), a reduction in economic inequality, and a higher proportion of timely vaccinations. Yet, the lower contribution of outreach activities in the HSS catchment was associated with persistent inequalities in geographical coverage, which prevented achieving international coverage targets.

CONCLUSION: Investment in stronger primary care systems can improve vaccination coverage, reduce inequalities and improve the timeliness of vaccination via increases in routine immunisations.

WEB: 10.1136/bmjgh-2021-006824

IMPACT FACTOR: 4.280

CITED HALF-LIFE: 1.9

START COMMENTARY

In this study, Rajaonarifara *et al.* assess the impact of a health system strengthening (HSS) intervention on immunization rates in rural Madagascar. This article is important as it contributes evidence on the impact of strengthening health systems on routine and outreach immunizations, a largely understudied area in LMICs. The intervention took place in 5 communes (four from 2014-2016 and then one was added in 2017) in the region of Vatovavy Fitovinany. The intervention components are summarized in *Table S1* in the *Supplementary Materials.* The program included several activities at all levels of the health system, including at district hospitals, health centers, and in communities. A key strength of this study is the detailed description of the intervention, include the materials, actors, strategies, timing, and tailoring of the intervention components. Data utilized included both data on monthly immunization rates from 2014 to 2018 and a cohort data collection from a district-representative longitudinal cohort study (the Ifanadiana Health Outcomes and Prosperity longitudinal Evaluation). The former was utilized to analyze immunization rates at health centers while the latter was used to analyze vaccination coverage in the longitudinal cohort.

Overall, at health centers, immunization rates (age specific, children 12-23 months) had average per capita immunization that ranged from 0.02-0.21 (average: 0.08). The HSS intervention was associated with a significant increase in immunization rates (OR: 1.22 for measles, 1.49 for diphtheria, tetanus and pertussis [DTP]). However, these results diminished over time. In terms of population-level vaccination coverage changes, at baseline rates were from 54-59%, depending on vaccine type. During the intervention, coverage improved significantly, particularly in the HSS catchment area (Bacillus-Calmette Guerin [BCG]: 80.8%; measles: 73.2%). However, the goal of 90% coverage was not reached. In multivariate analysis assessing predictors of vaccine coverage (*Table 2*), factors such as low wealth status and distance to health centers were significantly negatively associated with coverage of the four vaccines. For every additional 10 km of distance from the health center, the odds of vaccination for measles were half as likely (OR: 0.52), and the odds of vaccination for BCG was a fifth as likely (OR: 0.22). In conclusion, Rajaonarifara *et al.* find that HSS improves routine immunization coverage at the health facility and population level. However, improvements are largely benefiting those near health facilities, demonstrating a need to target geographical inequalities in vaccine coverage in Madagascar.

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4. Meningitis during COVID -19 pandemic in the Democratic Republic of Congo: A call for concern.

Okonji O, Rackimuthu S, Gangat S, Mohanan P, Uday U, Islam Z, et al.

Clin Epidemiol Glob Health. 2022 Jan 11;13:100955.

PubMed ID: 35005300

ABSTRACT

Meningitis is a severe infection and a major public health challenge. The meningitis outbreak which had resurfaced amid the coronavirus disease 2019 (COVID-19) pandemic in the Democratic Republic of Congo (DRC) has been further stressing the health care systems that are already overburdened with detecting, preventing, and treating the current coronavirus disease. The recent meningitis outbreak in the DRC has resulted in a high case fatality ratio of 50% - an extremely worrying concern. Robust strategies are hence needed to curb the spread of the disease amid the COVID-19 pandemic, to prevent further adverse health outcomes and to mitigate the compounding burden on the country's healthcare systems. Several measures such as vaccination campaigns, adherence to sanitation and hygiene, improved surveillance and diagnostic capabilities could help prevent future epidemics in the country.

WEB: 10.1016/j.cegh.2021.100955

IMPACT FACTOR: N/A

CITED HALF-LIFE: 1.6

START COMMENTARY

In this commentary, Okonji *et al.* express concerns and recommendations regarding the recent meningitis outbreak in Democratic Republic of Congo (DRC), which has re-emerged during the COVID-19 pandemic. Okonji *et al.* describe the historic burden of meningitis in DRC, which had an estimated 118,000 cases between 2000 and 2018 with a mortality rate of 11.5%. The recent outbreak of 267 has an alarmingly high case fatality rate of 50%. Efforts to address the outbreak include crisis response committees, treatment at home and in health facilities, and the setup of mobile clinics. However, efforts to diagnose cases and contain spread have had limited success. Okonji *et al.* attributes this to the fragile health system, other ongoing outbreaks (e.g., measles), inadequate diagnostic capacity, limited information sharing, rumors of witchcraft, and poor surveillance systems. Timely and accurate diagnosis is especially challenging during the COVID-19 pandemic, given the overlapping clinical symptoms between SARS-CoV-2 and meningitis infection (e.g., fever, fatigue, mild respiratory symptoms).

Okonji *et al.* recommend standard outbreak prevention and control strategies to be implemented, including prevention, effective treatment, and epidemiological surveillance. Since both outbreaks (COVID-19 and meningitis) can be prevented with vaccines, increased vaccine coverage is needed. Another important recommendation is to address rumors of witchcraft through radio, newspapers, media, and leaders (i.e., community, traditional, and religious).

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5. Two decades of regional trends in vaccination completion and coverage among children aged 12-23 months: an analysis of the Uganda Demographic Health Survey data from 1995 to 2016.

Okello G, Izudi J, Ampeire I, Nghania F, Dochez C, Hens N.

BMC Health Serv Res. 2022 Jan 11;22(1):40.

PubMed ID: 34996445

ABSTRACT

BACKGROUND: Childhood vaccination is an important public health intervention but there is limited information on coverage, trends, and determinants of vaccination completion in Uganda at the regional level. We examined trends in regional vaccination coverage and established the determinants of vaccination completion among children aged 12-23 months in Uganda.

METHODS: We analyzed data from the women's questionnaire for the 1995-2016 Uganda Demographic Health Survey (UDHS). Vaccine completion was defined as having received a dose of Bacillus-Calmette Guerin (BCG) vaccine; three doses of diphtheria, pertussis, and tetanus (DPT) vaccine; three doses of oral polio vaccine (OPV) (excluding OPV given at birth); and one dose of measles vaccine. We performed Chi-square tests to compare vaccination completion by socio-demographic factors stratified by 10 sub-regions: Eastern, East Central, Central 1, Central 2, Kampala, Karamoja, North, Western, West Nile, and Southwest. We performed logistic regression analysis for each of the regions to identify factors associated with vaccination completion at 5% level of statistical significance.

RESULTS: Overall vaccination completion was 48.6% (95%CI, 47.2, 50.1) and ranged from 17.3% in Central 1 to 65.9% in Southwest. Vaccination completion rates declined significantly by 10.4% (95% confidence interval (CI), - 16.1, - 4.6) between 1995 and 2000, and increased significantly by 10.0% (95% CI, 4.6, 15.4) between 2000 and 2006, and by 5.4% (95% CI, 0.2, 10.6) between 2006 and 2011. Maternal education (secondary or higher level), receipt of tetanus toxoid (TT) during pregnancy, and possession of a child health card were associated with vaccination completion across all the sub-regions. Other factors like place of residence, religious affiliation, household wealth, maternal age, childbirth order, size of child at birth, and place of delivery were associated with vaccination completion but differed between the 10 sub-regions.

CONCLUSION: Besides considerable regional variations, the vaccination completion rate among children aged 12-23 months in Uganda remains suboptimal despite the availability of vaccines. Maternal education, receipt of TT, and possession of a child health card are associated with a higher likelihood of vaccination completion among children aged 12-23 months in all the regions of Uganda.

Interventions to improve the utilization of vaccination services in Uganda should consider these factors.

WEB: 10.1186/s12913-021-07443-8
IMPACT FACTOR: 1.987
CITED HALF-LIFE: 5.6

START COMMENTARY

In this retrospective study, Okello *et al.* describe regional trends in and determinants of vaccination completion and coverage among children aged 12-23 months from 1995 to 2016 in Uganda. This study is impactful as it describes two decades of trends, and highlights regions and populations to focus on for future immunization efforts. Data utilized for this survey came from the women's questionnaire for the 1995-2016 Demographic Health Survey (DHS). Okello *et al.* used the vaccine schedule in Uganda to define vaccination completion. This involves a dose of BCG, three doses of DPT, three doses of oral polio vaccine (OPV), and one dose of measles. Determinants of vaccination that were evaluated included child characteristics (sex, birth order, size at birth), maternal factors (age, education, occupation, marital status), household characteristics (wealth index, religion, rural or urban), and health services factors (antenatal care visits, tetanus toxoid injections, and place of delivery).

Okello *et al.* found that the proportion of fully vaccinated children varied at national and sub regional levels (*Table 1).* In 1995, the lowest proportion was 28.2% in East Central sub-region to 64.2% in the Southwest sub-region. In 2016 (the last year of the survey), the lowest proportion was 45.0% in East Central and highest was 65.9% in Southwest, mirroring trends from two decades prior. After a decline in most sub-regions between 1995-2000, the proportion of fully vaccinated children generally increased, as is shown in *Figure 1.* To quantify this change, Okello *et al.* calculated the five-year percentage change across all regions, religions, residence (rural vs. urban), wealth indices, and overall (*Table 2).* Although most subgroups increased from 2000 to 2006, 2006 to 2011, and 2011 to 2016, the magnitude of the increases varied. The largest increase from 2000 to 2006 was 25.9% in Central sub-region, whereas Kampala saw the greatest increase from 2006-2011 (21.9%). There was a decline of 16.1% in Kampala and 1.2% in Western from 2011 to 2016. In a multivariate analysis, predictors of vaccination completion varied between sub-regions (*Table 3).* For example, in the Northern sub-region, children who were protestants and of middle wealth index were less likely to complete vaccines when compared to their catholic and poorest wealth peers. Overall, this detailed information by sub-region and population can inform future immunization efforts in Uganda.

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6. Assessing the usefulness of policy brief and policy dialogue as knowledge translation tools towards contextualizing the accountability framework for routine immunization at a subnational level in Nigeria.

Ogbonnaya L, Okedo-Alex I, Akamike I, Azuogu B, Urochukwu H, Ogbu O, et al.

Health Res Policy Syst. 2022 Jan 03;19(1):154.

PubMed ID: 34969398

ABSTRACT

BACKGROUND: Evidence suggests that implementing an accountability mechanism such as the accountability framework for routine immunization in Nigeria (AFRIN) will improve routine immunization (RI) performance. The fact that the AFRIN, which was developed in 2012, still had not been operationalized at the subnational level (Ebonyi State) by 2018 may in part account for the poor RI coverage (33%) in 2017. Knowledge translation (KT) is defined as the methods for closing the gaps from knowledge to practice. Policy briefs (useful in communicating research findings to policy-makers) and policy dialogues (that enable stakeholders to understand research evidence and create context-resonant implementation plans) are two KT tools. This study evaluated their usefulness in enabling policy-makers to contextualize AFRIN in Ebonyi State, Nigeria.

METHODS: The study design was cross-sectional descriptive with mixed-methods data collection. A policy brief developed from AFRIN guided deliberations in a 1-day multi-stakeholder policy dialogue by 30 policy actors. The usefulness of the KT tools in contextualizing policy recommendations in the AFRIN was assessed using validated questionnaires developed at McMaster University, Canada.

RESULTS: At the end of the policy dialogue, the policy options in the policy brief were accepted but their implementation strategies were altered to suit the local context. The respondents' mean ratings (MNR) of the overall usefulness of the policy brief and the policy dialogue in contextualizing the implementation strategies were 6.39 and 6.67, respectively, on a seven-point Likert scale (very useful). The MNR of the different dimensions of the policy brief and policy dialogue ranged from 6.17 to 6.60 and from 6.10 to 6.83, respectively (i.e. moderately helpful to very helpful).

CONCLUSION: The participants perceived the KT tools (policy brief and policy dialogue) as being very useful in contextualizing policy recommendations in a national policy document into state context-resonant implementable recommendations. We recommend the use of these KT tools in operationalizing AFRIN at the subnational level in Nigeria.

WEB: 10.1186/s12961-021-00804-z
IMPACT FACTOR: 2.365
CITED HALF-LIFE: 4.6

START COMMENTARY

In this mixed-methods study, Okello *et al.* assess the usefulness of policy briefs and policy dialogues in enabling policy makers to contextualize an accountability framework for routine immunization in Nigeria (AFRIN). This study is important as it describes the operationalization of an accountability framework, which identifies roles and responsibilities in routine immunization (RI) management, sanctions, and incentives. To introduce the AFRIN in Ebonyi state, a policy brief and policy dialogue were established. Participants in this study included stakeholders in the RI program in Ebonyi state, including career health policymakers, political health policymakers, coordinators from the United Nations, and other developmental partners.

A policy brief, titled Operationalizing the Accountability Framework for Routine Immunization in Nigeria for Ebonyi State, was developed and included policy options and implementation strategy recommendations, shown in *Table 1.* A policy dialogue was then organized using the policy brief as a guiding document. Each policy option and implementation strategy was discussed and deliberated upon in small groups. As a result, the participants adopted all the policy options and made modifications to the implementation strategies based on the discussions. A comparison of policy options and contextual implementation strategies is presented in *Table 2.* One recommended policy is timely and complete data reporting. A contextualized implementation strategy for this policy is to consider intersectoral collaboration between the ministries of health, power, works, and information to supply and maintain solar panels and freezers to ensure power for charging phones, laptops, and other devices. Overall, participants described the policy dialogue and brief as useful approaches for discussing and generating solutions to the vaccine problems. In terms of suggested future improvements to the policy brief, participants recommended adding additional details about the local context, providing information on the methods and evidence used to select and synthesize policy recommendations, distributing the policy brief earlier, and making it shorter. In conclusion, this study shows that utilizing knowledge translation tools such as policy briefs and dialogues are feasible and useful for contextualizing and operationalize national policy documents. Lessons learned from this study can be applied to other states and policy roll out efforts.

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7. Impact of the SARS-CoV-2 pandemic on routine immunisation services: evidence of disruption and recovery from 170 countries and territories.

Shet A, Carr K, Danovaro-Holliday M, Sodha S, Prosperi C, Wunderlich J, et al.

Lancet Glob Health. 2022 Feb 02;10(2):e186-e194.

PubMed ID: 3495197335063102

ABSTRACT

BACKGROUND: The SARS-CoV-2 pandemic has revealed the vulnerability of immunisation systems worldwide, although the scale of these disruptions has not been described at a global level. This study aims to assess the impact of COVID-19 on routine immunisation using triangulated data from global, country-based, and individual-reported sources obtained during the pandemic period.

METHODS: This report synthesised data from 170 countries and territories. Data sources included administered vaccine-dose data from January to December, 2019, and January to December, 2020, WHO regional office reports, and a WHO-led pulse survey administered in April, 2020, and June, 2020. Results were expressed as frequencies and proportions of respondents or reporting countries. Data on vaccine doses administered were weighted by the population of surviving infants per country.

FINDINGS: A decline in the number of administered doses of diphtheria-pertussis-tetanus-containing vaccine (DTP3) and first dose of measles-containing vaccine (MCV1) in the first half of 2020 was noted. The lowest number of vaccine doses administered was observed in April, 2020, when 33% fewer DTP3 doses were administered globally, ranging from 9% in the WHO African region to 57% in the South-East Asia region. Recovery of vaccinations began by June, 2020, and continued into late 2020. WHO regional offices reported substantial disruption to routine vaccination sessions in April, 2020, related to interrupted vaccination demand and supply, including reduced availability of the health workforce. Pulse survey analysis revealed that 45 (69%) of 65 countries showed disruption in outreach services compared with 27 (44%) of 62 countries with disrupted fixed-post immunisation services.

INTERPRETATION: The marked magnitude and global scale of immunisation disruption evokes the dangers of vaccine-preventable disease outbreaks in the future. Trends indicating partial resumption of services highlight the urgent need for ongoing assessment of recovery, catch-up vaccination strategy implementation for vulnerable populations, and ensuring vaccine coverage equity and health system resilience.

FUNDING: US Agency for International Development.

WEB: 10.1016/S2214-109X(21)00512-X
IMPACT FACTOR: 21.597
CITED HALF-LIFE: 3.1

START COMMENTARY

In this descriptive study, Shet *et al.* comprehensively summarize the global impact of COVID-19 on routine immunization. Although many studies have studied this phenomenon, this study is the first to provide information on the magnitude on a global scale across 170 countries. Data for this study included information on disruptions and administered doses from the World Health Organization (WHO) regional offices and from two web-based pulse surveys conducted in April 2020 and June 2020.

In April 2020, substantial disruptions were shown across all WHO regions (Figure 1). The Region of the Americas (AMR) region had the highest disruptions to vaccine demand, vaccine supply, and health workforce, and the Southeast Asia Region (SEAR) region had the highest disruption in routine immunization. In the WHO Africa region, 57% of the 30 reporting member states had reported disruptions to immunizations. Similar trends were shown in other regions (Americas: 53%, Eastern Mediterranean: 55%, Europe: 30%). To demonstrate the relative difference, Shet *et al.* calculate the weighted mean relative difference in DTP3 and measles containing vaccine (MCV) first dose between January to December 2020 and January to December 2019 in *Figure 2.* A sharp decline is evident across most regions, although the magnitude varies widely. In the second pulse survey in June 2020, 82 countries responded. Of these, vaccination services improved in only 11 (18%) of the countries by June 2020. When asked what caused the disruptions, the main factors reported factors included a lack of personal protective equipment for healthcare staff (49%), travel restrictions (40%), and a lack of healthcare workers (43%). One positive finding was that 77% of respondents noted that catch-up vaccination activities were planned or ongoing, including outreach services, expanded fixed-post services, intensification of routine immunization, child health days, and supplementary activities. One important limitation of this study is that conclusions were drawn only from countries which reported to the WHO regional office or responded to the survey, potentially biasing estimates of disruptions. This descriptive study reports the substantial impact that COVID-19 has had on routine immunization services worldwide in 2020.

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8. Can We Use Routine Data for Strategic Decision Making? A Time Trend Comparison Between Survey and Routine Data in Mali.

Sawadogo-Lewis T, Keita Y, Wilson E, Sawadogo S, T..r..ra I, Sangho H, et al.

Glob Health Sci Pract. 2022 Jan 01;9(4):869-880.
PubMed ID: 34933982

ABSTRACT

BACKGROUND: Countries with scarce resources need timely and high-quality data on coverage of health interventions to make strategic decisions about where to allocate investments in health. Household survey data are generally regarded as “gold standard,” high-quality data. This study assessed the comparability of intervention coverage time trends from routine and survey data at national and subnational levels in Mali.

METHODS: We compared 3 coverage indicators: contraceptive prevalence rate, institutional delivery, and 3 doses of diphtheria, pertussis, and tetanus (DPT3) vaccine, using 3 Mali Demographic and Health Surveys (DHS 2001, 2006, and 2012-2013) and routine health system data covering 2001-2012. For routine data, we used local health information system (HIS) annual reports and an HIS database. To compare time trends between the data sources, we calculated the percentage point change and 95% confidence interval from 2001-2006 and 2006-2012. We then computed the absolute and relative differences between the 2 data sources for each indicator over time at national and regional levels and assessed their level of significance.

RESULTS: The direction and magnitude of the time trends of contraceptive prevalence rate, institutional delivery, and DPT3 vaccine from 2001 to 2012 were similar at the national level between data sources. At the regional level, there were significant differences in the magnitude and direction of time trends for institutional delivery and the DPT3 vaccine; contraceptive prevalence trends were more consistent. Routine data tended to overestimate DPT3 coverage, and underestimate institutional delivery and contraceptive prevalence relative to survey data.

CONCLUSION: Routine data in Mali-particularly at the national level-appear to be appropriate for use to inform program planning and prioritization, but routine time trends should be interpreted with caution at the subnational level. For program evaluations, routine data may not be appropriate to draw accurate inferences about program impact.

WEB: 10.9745/GHSP-D-21-00281
IMPACT FACTOR: 2.352
CITED HALF-LIFE: 3.6

START COMMENTARY

Sawadogo-Lewis *et al.* compare three intervention coverage indicators: contraceptive prevalence rate, institutional delivery, and 3 doses of DPT using household surveys (DHS) and routine health system data from 2001 to 2012 to determine absolute and relative differences in each indicator over time. This study is important as it assess if routine data can be used for strategic decision making in health, rather than household surveys. Although household surveys such as the DHS and Multiple Indicator Cluster Surveys are considered the 'gold standard' for producing high quality data for decision-making, they are costly and conducted infrequently (every few years). Given that routine data is used for decision making, it is important to understand the comparability between the routine data and the 'gold standard' survey data. Routine data was obtained from the health information system annual reports and included each indicator, year, and region. DHS data collected in 2002, 2006, and 2012-2013 were utilized. All districts were surveyed in 2001 and 2006 whereas 6 were excluded in 2012 due to security concerns.

Figures 1-3 demonstrated national time trends at national and regional levels between routine and survey data for contraceptive, DPT3, and institutional delivery, respectively. Overall, DHS data indicated higher contraceptive and facility delivery rates over the period, whereas routine data indicated higher national DPT coverage. For regional trends, the time trends varied widely across the period. When comparing regional rates of all three indicators, there was considerably less consistency than in national estimates. Sawadogo-Lewis *et al.* show that almost all regions have at least one statistically significant difference between survey and routine data trends. Overall, the authors conclude that across 10 years of data, time trends for contraceptive prevalence, DTP3, and institutional delivery indicators from survey and routine data are comparable on a national, but not a regional level. As such, routine coverage may not meet the needs of certain applications which require high-quality precise data (e.g., impact evaluations) but can be utilized for planning and prioritization in Mali.

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9. Measles in conflict-affected northern Syria: results from an ongoing outbreak surveillance program.

Mehtar S, AlMhawish N, Shobak K, Reingold A, Guha-Sapir D, Haar R.

Confl Health. 2021 Dec 26;15(1):95.

PubMed ID: 34933672

ABSTRACT

BACKGROUND: The Syrian conflict has dramatically changed the public health landscape of Syria since its onset in March of 2011. Depleted resources, fractured health systems, and increased security risks have disrupted many routine services, including vaccinations, across several regions in Syria. Improving our understanding of infectious disease transmission in conflict-affected communities is imperative, particularly in the Syrian conflict. We utilize surveillance data from the Early Warning Alert and Response Network (EWARN) database managed by the Assistance Coordination Unit (ACU) to explore trends in the incidence of measles in conflict-affected northern Syria and analyze two consecutive epidemics in 2017 and 2018.

METHODS: We conducted a retrospective time-series analysis of the incidence of clinically suspected cases of measles using EWARN data between January 2015 and June 2019. We compared regional and temporal trends to assess differences between geographic areas and across time.

RESULTS: Between January 2015 and June 2019, there were 30,241 clinically suspected cases of measles reported, compared to 3193 cases reported across the whole country in the decade leading up to the conflict. There were 960 regional events that met the measles outbreak threshold and significant differences in the medians of measles incidence across all years (p-value < 0.001) and in each pairwise comparison of years as well as across all geographic regions (p-value < 0.001). Although most governorates faced an elevated burden of cases in every year of the study, the measles epidemics of 2017 and 2018 in the governorates of Ar-Raqqa, Deir-Ez-Zor, and Idlib accounted for over 71% of the total suspected cases over the entire study period.

CONCLUSIONS: The 2017 and 2018 measles epidemics were the largest since Syria eliminated the disease in 1999. The regions most affected by these outbreaks were areas of intense conflict and displacement between 2014 and 2018, including districts in Ar-Raqqa, Deir-Ez-Zor, and Idlib. The spread of measles in northern Syria serves as an indicator of low immunization coverage and limited access to care and highlights the Syrian peoples' vulnerability to infectious diseases and vaccine preventable diseases in the setting of the current conflict.

WEB: 10.1186/s13031-021-00430-0
IMPACT FACTOR: 2.723
CITED HALF-LIFE: 4.7

START COMMENTARY

In this retrospective time-series analysis, Mehtar *et al.* assess the incidence of clinically suspected measles cases, including regional and temporal trends to assess differences between geographic areas and across time, between January 2015 and June 2019. This study is important as it contributes to an understanding of measles transmission in a severe conflict, which can inform and prevent future outbreaks during the ongoing turmoil. Mehtar *et al.* describe the historical context for the measles outbreaks, including the national elimination of measles in 1999 and the relatively high vaccine coverage before the conflict. Surveillance data utilized for this study was collected by the Early Warning Alert and Response Network (EWARN), a system developed specifically for rapid, cost-effective detection of infectious disease in humanitarian and conflict settings. Data extracted included weekly case countries stratified by sex, age groups (⩽ 5 years of age, > 5 years of age), and subdistrict.

A total of 30,241 suspected cases of measles were reported in opposition-controlled territories during the four and a half years. The highest proportion of suspected cases were found in the governorates of Deir-Ez-Zor (29.9%), Ar-Raqqa (29.1%), Aleppo (19.1%), and Idlib (18.3%). Children under 5 years accounted for 60.9% of cases. *Figure 2* demonstrated the weekly number and weekly incidence of suspected measles cases by governorate. The epidemic in 2017 was primarily in Abu Kamal, whereas the 2018 outbreak was more widespread affecting in Al-Mayadin, Deir-Ez-Zor, Al-Raqqa, and other areas. One notable positive finding was that districts with a high incidence in 2017 decreased the following year and no outbreaks occurred in 2019 due to decreased susceptibility and vaccine efforts. In assessing age trends, the highest risk found was in children less than 5 years old (*Table 2)*. There were some differences by sex, although these were only significant in children ≥5 years old. Overall, Mehtar *et al.* demonstrate that it is feasible to collect, and report frequent, high-quality epidemiological surveillance data, which can describe trends, geography, and vulnerability of populations during a conflict.

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10. Cost-effectiveness of HPV vaccination in 195 countries: A meta-regression analysis.

Rosettie K, Joffe J, Sparks G, Aravkin A, Chen S, Compton K, et al.

PLoS One. 2022 Jan 10;16(12):e0260808.
PubMed ID: 34928971

ABSTRACT

Cost-effectiveness analysis (CEA) is a well-known, but resource intensive, method for comparing the costs and health outcomes of health interventions. To build on available evidence, researchers are developing methods to transfer CEA across settings; previous methods do not use all available results nor quantify differences across settings. We conducted a meta-regression analysis of published CEAs of human papillomavirus (HPV) vaccination to quantify the effects of factors at the country, intervention, and method-level, and predict incremental cost-effectiveness ratios (ICERs) for HPV vaccination in 195 countries. We used 613 ICERs reported in 75 studies from the Tufts University's Cost-Effectiveness Analysis (CEA) Registry and the Global Health CEA Registry and extracted an additional 1,215 one-way sensitivity analyses. A five-stage, mixed-effects meta-regression framework was used to predict country-specific ICERs. The probability that HPV vaccination is cost-saving in each country was predicted using a logistic regression model. Covariates for both models included methods and intervention characteristics, and each country's cervical cancer burden and gross domestic product per capita. ICERs are positively related to vaccine cost, and negatively related to cervical cancer burden. The mean predicted ICER for HPV vaccination is 2017 US$4,217 per DALY averted (95% uncertainty interval (UI): US$773-13,448) globally, and below US$800 per DALY averted in 64 countries. Predicted ICERs are lowest in Sub-Saharan Africa and South Asia, with a population-weighted mean ICER across 46 countries of US$706 per DALY averted (95% UI: $130-2,245), and across five countries of US$489 per DALY averted (95% UI: $90-1,557), respectively. Meta-regression analyses can be conducted on CEA, where one-way sensitivity analyses are used to quantify the effects of factors at the intervention and method-level. Building on all published results, our predictions support introducing and expanding HPV vaccination, especially in countries that are eligible for subsidized vaccines from GAVI, the Vaccine Alliance, and Pan American Health Organization.

WEB: 10.1371/journal.pone.0260808
IMPACT FACTOR: 2.740
CITED HALF-LIFE: 5.6

START COMMENTARY

This meta-regression analysis summarizing findings from 75 cost-effectiveness studies (CEAs) on human papillomavirus (HPV). This study makes a significant contribution as it provides estimates of incremental cost-effectiveness ratios (ICERs) by country, intervention, and type of method. Data for this study was obtained from the Tufts University Center for the Evaluation of Risk in health registries. Specifically, the Cost-Effectiveness Analysis Registry houses 7,287 studies which all measure cost per quality-adjusted life years (QALYs) averted, and the Global CEA study houses 621 studies which measures cost per disability-adjusted life years (DALYs) averted. After excluding studies which did not include adequate information (i.e., discount rates, time horizon, intervention, or comparator) and those which did not focus on HPV vaccines at health centers, a total of 76 studies were included. Covariates extracted included vaccine cost, vaccine coverage, vaccine distribution for both sexes or females only, and discount rate for costs and health outcomes.

Firstly, Rosettie *et al.* evaluated on three independent variables to explain variation in ICERs: vaccine cost, cervical cancer burden, and gross domestic product (GDP) per capita. Results for the model fit are shown in *Figure 2.* A higher vaccine cost leads to a higher ICER whereas higher burden leads to a lower ICER given increases in vaccine health benefits. GDP has a less obvious pattern, as the ICER decreases as health systems improve given treatment savings. However, when the higher costs of vaccine administration exceed the treatment savings, the ICER increases. Overall, the adjusted mean predicter ICER is 2017 US$4,217 per DALY averted (95% UI): US$773–13,448). The lowest ICERs were shown in Congo (Brazzaville), Central African Republic, Eritrea, and Lesotho. Detailed findings by country are presented in *Figure 3* and *Table 2.* A key strength of this study is that is produces a set of standardized ICERs across 195 countries accounting for differences in epidemiological burden, methods, data sources, and model assumptions. Such heterogeneity in studies makes it challenging for decision-makers to determine if HPV should be implemented, underscoring the need for a meta-regression analysis like this.

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Appendix

The literature search for the February 2022 Vaccine Delivery Research Digest was conducted on January 23, 2022. We searched English language articles indexed by the US National Library of Medicine and published between December 15, 2021 and January 14, 2022. The search resulted in 588 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]) (“2021/12/15”[PDAT] : “2022/01/14”[PDAT]))