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REPORT TO THE BILL & MELINDA GATES FOUNDATION

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PRODUCED BY: PAUL, S; BABIGUMIRA, JB.

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- A qualitative study to assess the feasibility of implementing a maternal vaccination strategy against pertussis and other pathogens, to determine mothers' attitudes about vaccines, and to identify barriers and facilitating factors to vaccine uptake in Zambia.

6. Poverty reduction and equity benefits of introducing or scaling up measles, rotavirus and pneumococcal vaccines in low-income and middle-income countries: a modelling study.

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- A study to develop a cost-epidemiological simulation model to estimate the effect of measles, rotavirus, and pneumococcal conjugate vaccine on financial risk protection in low-and middle-income countries.



7. A systematic review of hepatitis B screening economic evaluations in low- and middle-income countries.

[{Abstract & START Scientific Comment}](#) [{Full article}](#)

- A systematic review to assess economic evidence of hepatitis B vaccine screening in low- and middle-income countries, analyze existing hepatitis B vaccine-specific economic evaluations, and provide policy and research recommendations.

8. Planning for globally coordinated cessation of bivalent oral poliovirus vaccine: risks of non-synchronous cessation and unauthorized oral poliovirus vaccine use.

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- An analysis of the implementation risks of oral polio vaccine cessation and the effects of pre-cessation vaccination strategies for serotypes 1 and 3 globally.

9. The potential impact of a prophylactic vaccine for Ebola in Sierra Leone.

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- An analysis of a newly developed differential equations model to simulate characteristics of the Ebola virus epidemic based on the 2014 Ebola outbreak in Sierra Leone.

10. Evaluation of nationwide supplementary immunization in Lao People's Democratic Republic: Population-based seroprevalence survey of anti-measles and anti-rubella IgG in children and adults, mathematical modelling and a stability testing of the vaccine.

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- A cross-sectional study to estimate measles and rubella population immunity, evaluate vaccine effectiveness, and use a mathematical model to determine the number of congenital rubella syndrome cases averted by supplementary immunization activities (2011) for children and adults in Lao PDR.

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DETAILS OF ARTICLES

1. [Benefits and challenges in using sero-prevalence data to inform models for measles and rubella elimination.](#)

Winter AK, Martinez ME, Cutts FT, Moss WJ, Ferrari M, McKee A, et al.

J Infect Dis. 2018 Mar 19. [Epub ahead of print]

PubMed ID: 29562334

ABSTRACT

Control efforts for measles and rubella are intensifying globally. It becomes increasingly important to identify and reach remaining susceptible populations as elimination is approached. Serological surveys for measles and rubella can potentially measure susceptibility directly, but their use remains rare. Here, using simulations, we outline key subtleties in interpretation associated with the dynamic context of age-specific immunity, highlighting how the patterns of immunity predicted from disease surveillance and vaccination coverage data may be misleading. High quality representative sero-surveys could provide a more accurate assessment of immunity if challenges of conducting, analyzing, and interpreting them are overcome. We frame the core disease control and elimination questions that could be addressed by improved serological tools, discussing challenges and suggesting approaches to increase the feasibility and sustainability of the tool. Accounting for the dynamical context, sero-surveys could play a key role in efforts to achieve and sustain elimination.

WEB: [10.1093/infdis/jiy137](https://doi.org/10.1093/infdis/jiy137)

IMPACT FACTOR: 6.34

CITED HALF-LIFE: 8.60

START EDITORIAL COMMENT: This study used rubella transmission models to demonstrate age-specific seroprevalence profiles before and after exposure to vaccination. Although vaccination modeling can be beneficial for determining effectiveness and impact of vaccination strategies, the quality of results are heavily dependent on data quality; insufficient reporting of vaccination coverage can affect the results and lead to biased estimates. Vaccination strategies for measles and rubella in near-elimination settings should include considerations for the age profile of immunity and the changes in natural and vaccine-derived immunity.

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2. [Socioeconomic factors associated with full childhood vaccination in Bangladesh, 2014.](#)

Boulton ML, Carlson BF, Power LE, Wagner AL.

Int J Infect Dis. 2018 Apr;69:35-40.

PubMed ID: 29421667

ABSTRACT

OBJECTIVES:

Childhood vaccination in Bangladesh has improved, but there is room for improvement. This study estimated full immunization coverage in Bangladeshi children and characterized risk factors for incomplete immunization.

METHODS:

Using the 2014 Bangladesh Demographic and Health Survey (DHS), full vaccination of children aged 12 to 24 months was examined; this was defined as the receipt of one dose of bacillus Calmette-Guérin (BCG), three doses of pentavalent vaccine, three doses of oral polio vaccine (OPV), and one dose of measles-containing vaccine (MCV). Associations between full vaccination and selected risk factors were assessed by logistic regression.

RESULTS:

Overall, 83% of children were fully vaccinated. BCG had the highest completion (97%), followed by OPV (92%), pentavalent vaccine (91%), and MCV (85%). Full vaccination coverage ranged from 64.4% in Sylhet to 90.0% in Rangpur and was lowest among non-locals of all regions (78.4%). Children who were in the lowest wealth quintile, who had mothers without antenatal care visits, or who had mothers without autonomy in healthcare decision-making were less likely to be fully vaccinated.

CONCLUSIONS:

Overall, full vaccination of children is high, but varies by vaccine type. Disparities still exist by wealth and by region. Maternal access to care and autonomy in healthcare decision-making are associated with higher vaccination coverage.

WEB: [10.1016/j.ijid.2018.01.035](https://doi.org/10.1016/j.ijid.2018.01.035)

IMPACT FACTOR: 2.51

CITED HALF-LIFE: 4.70

START EDITORIAL COMMENT: In this study, a total of 101 children who were 12-24 months of age were assessed for immunization status. Full vaccination was highest among urban children who were born outside of the home and belonged to smaller households. Full vaccination was lowest in Sylhet region (64.4%) and Barisal region (81.7%) indicating that targeted immunization programs for large, low-income, and low-education households could be beneficial for these two regions. One finding of note was the impact of women's autonomy as a predictor for child's vaccination status. Promoting women's empowerment, especially among women of child-bearing age, through education and other metrics of gender equity could prove advantageous for child immunization.

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3. [An evaluation of South Africa's public-private partnership for the localisation of vaccine research, manufacture and distribution.](#)

Walwyn DR, Nkolele AT.

Health Res Policy Syst. 2018 Mar 27;16(1):30.

PubMed ID: 29587777

ABSTRACT

BACKGROUND:

Public-private partnerships (PPPs), widely used as a means of leveraging the skills, expertise and resources of the private sector to mutual advantage, were similarly adopted by South Africa to support public sector delivery. This study has evaluated one such partnership, namely the Biovac Institute, which was established in 2003 to cover vaccine research and development, manufacturing, and supply. The initiative was highly unusual given that it attempted to combine all three aspects in a single PPP.

METHODS:

The research has followed a concurrent mixed methods approach. In the quantitative study, data for prices and product volumes were extracted from secondary data sources and used to calculate the economic cost and value-for-money of the PPP. Simultaneously, a qualitative study was undertaken in which a number of key stakeholders were interviewed using a semi-structured questionnaire on their perceptions of the PPP's value.

RESULTS:

The institute earns a premium on the procurement cost of a broad range of vaccines required by the South African National Department of Health for its immunisation programme, the net value of which was US\$85.7 million over the period 2010 to 2014. These funds were used to finance the institute's operations, including vaccine research, distribution and quality control. Capital expenditure to support the establishment of facilities for laboratory testing, packaging and labelling, filling, formulation and, finally, active pharmaceutical ingredient manufacture, approximately US\$40 million in total, had to be secured through loans and grants. According to the respondents in the qualitative survey, the principal benefit of the PPP has been the uninterrupted supply of vaccines and the ability to respond quickly to vaccine shortages. The main disadvantages appear to have been a slow and ineffectual establishment of a vaccine manufacturing centre and, initially, a limited ability to negotiate highly competitive vaccine prices.

CONCLUSIONS:

Overall, it is concluded that a positive value-for-money has been achieved and the institute has been of significant public benefit. Relationships of this nature can be used to achieve public health goals, but need to be realistic about timeframes, costs and the limitations of relational governance in ensuring that complex programmatic outcomes are achieved. It is recommended that a more incremental approach, with clearer contractual goals, penalties and incentives, is adopted in attempting initiatives aimed at the localisation of manufacturing technology by leveraging public procurement.

WEB: [10.1186/s12961-018-0303-3](https://doi.org/10.1186/s12961-018-0303-3)

IMPACT FACTOR: 2.27

CITED HALF-LIFE: NA

START EDITORIAL COMMENT: In the South Africa, the motivation for a public-private partnership in the vaccination space was a need for maintaining security of supply through local manufacturing. The public-private partnership, the Biovac Institute (BI) was created with the following objectives: vaccine production (capacity, quality, and skills); research and development; tapping markets (general and



exports); and black economic empowerment. The overall positive cost-benefit profile achieved by the BI over time shows it could be a promising model for countries to negotiate internationally competitive prices, develop skills and technology transfers, create uninterrupted vaccine supply, and create a successful research and development product.

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4. [Effectiveness of 13-pneumococcal conjugate vaccine \(PCV13\) against invasive pneumococcal disease in children in the Dominican Republic.](#)

Tomczyk S, Lessa FC, Sánchez J, Peña C, Fernández J, Gloria Carvalho M, et al.

BMC Infect Dis. 2018 Apr 2;18(1):152.

PubMed ID: 29609548

ABSTRACT

BACKGROUND:

Limited data are available on the effectiveness of 13-valent pneumococcal conjugate vaccine (PCV13) in resource-poor settings and PCV naïve populations. The Dominican Republic introduced PCV13 in September 2013 using a 2 + 1 schedule (2, 4, and 12 months) without a catch-up campaign. We evaluated PCV13 effectiveness against vaccine-type (VT) invasive pneumococcal disease (IPD) among children in the Dominican Republic.

METHODS:

We conducted a matched case-control study. A case-patient was defined as VT-IPD identified by culture or polymerase chain reaction (PCR) from a normally sterile-site in a hospitalized child who was age-eligible to have received ≥ 1 PCV13 dose. Four age- and neighborhood-matched controls were enrolled for each case-patient. We collected demographic, vaccination history, and risk factor data. Conditional logistic regression was performed. Vaccine effectiveness was calculated as $(1 - \text{adjusted matched odds ratio for vaccination}) \times 100\%$.

RESULTS:

We enrolled 39 case-patients and 149 matched-controls. Most case-patients had pneumonia with pleural effusion (64%), followed by meningitis (28%) and septicemia (13%). The most common pneumococcal serotypes identified included 14 (18%), 3 (13%), 19A (10%), and 1 (8%). Fewer case-patients had ≥ 1 PCV13 dose as compared to controls (61.5% vs. 80.0%; $p = 0.006$). Adjusting for malnutrition and socioeconomic status, VE of ≥ 1 PCV13 dose compared to no doses was 67.2% (95% CI: 2.3% to 90.0%). Only 44% of controls were up-to-date for PCV13, suggesting low vaccine coverage in the population.

CONCLUSIONS:

We found that PCV13 provided individual protection against VT-IPD in this resource-poor setting with a PCV-naïve population, despite low PCV13 coverage. Expanding vaccination coverage might increase PCV13 impact.

WEB: [10.1186/s12879-018-3047-3](https://doi.org/10.1186/s12879-018-3047-3)

IMPACT FACTOR: 2.61

CITED HALF-LIFE: 3.80

START EDITORIAL COMMENT: In this study, cerebrospinal fluid (CSF), pleural fluid, and joint fluid of children were tested for: 1) presence of pneumococcal antigen, and 2) presence of the pneumococcal *lytA* gene. Findings show high PCV13 effectiveness against invasive pneumococcal disease caused by 6A/6B serotypes. Additionally, cases were more likely among malnourished children ($p=0.003$). Although results were promising, high costs of PCV vaccine directly influenced low vaccination coverage rates in the Dominican Republic and other low- and middle-income countries in the region.

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5. [“When you are injected, the baby is protected:” Assessing the acceptability of a maternal Tdap vaccine based on mothers’ knowledge, attitudes, and beliefs of pertussis and vaccinations in Lusaka, Zambia.](#)

Larson Williams A, McCloskey L, Mwale M, Mwananyanda L, Murray K, Herman AR, et al.
Vaccine. 2018 May 17;36(21):3048-3053.
PubMed ID: 29653846

ABSTRACT

BACKGROUND:

Routine childhood immunization coverage has been low in northern Nigeria. While local authorities and international partners have been working hard to improve coverage, population preferences for interventions have not been documented. This study aimed to understand parents' preferences and identify possible interventions to improve uptake of childhood immunization.

METHODS:

Preferences for immunization interventions were elicited using a best-worst scaling (BWS) instrument among parents with children under five. We explored the value of six program attributes (each varying across three levels) identified through a literature review and engagement with local stakeholders. In each of 18 hypothetical programs identified through a main effect orthogonal design, respondents selected the best and worst attributes that may facilitate vaccination of children. Assuming sequential best-worst responses, we used conditional logit to estimate preferences. We employed latent class analysis (LCA) to categorize and examine respondents' preferences across interventions.

RESULTS:

97 men and 101 women in 198 households were surveyed. The most preferred level for each attribute included door-to-door vaccinations, free food supplements, bundling with nutritional support programs, involvement of religious leaders, information dissemination through media campaigns, and strengthening of health services by the government. Three types of preferences were recognized in the LCA. The value-driven group (14%) characterized by youngest age, predominantly female, and lower education perceived bundled services with food and nutritional programs as the most important feature of an intervention. Convenience and information seekers (28%) characterized by oldest age and the lowest employment preferred door-to-door vaccinations and media campaigns. The remaining complacent group (58%), characterized by highest education and highest employment, did not show strong preferences to any intervention compared to the other two groups.

CONCLUSIONS:

Routine immunization programs should consider joining forces with food and nutritional programs to improve vaccination uptake. Incorporating door-to-door visits and media campaigns to target older and unemployed populations may increase childhood immunization uptake in northern Nigeria.

WEB: [10.1016/j.vaccine.2018.03.081](https://doi.org/10.1016/j.vaccine.2018.03.081)

IMPACT FACTOR: 3.41

CITED HALF-LIFE: 5.90

START EDITORIAL COMMENT: This qualitative analysis included focus group discussions (FGDs) with mothers ages 18-39 in Lusaka, Zambia. FGDs included vaccine-related themes such as knowledge of whooping cough; knowledge of vaccines; attitudes toward maternal vaccines; and, factors that influence healthcare and vaccine uptake. Results suggest that mothers acknowledge that there are varying levels



of: (1) partner involvement in hospital visits, (2) partner restrictions on women to access healthcare, and knowledge of vaccinations. Study limitations included self-selection bias and the influence of underlying study population vulnerabilities, inherent limitations of purposive sampling. Study results can be used by public health officials to better address and design vaccine-related strategies and programs at the population level.

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6. [Poverty reduction and equity benefits of introducing or scaling up measles, rotavirus and pneumococcal vaccines in low-income and middle-income countries: a modelling study.](#)

Riumallo-Herl C, Chang AY, Clark S, Constenla D, Clark A, Brenzel L.

BMJ Glob Health. 2018 Apr 9;3(2):e000613.

PubMed ID: 29662691

ABSTRACT

Introduction:

Beyond their impact on health, vaccines can lead to large economic benefits. While most economic evaluations of vaccines have focused on the health impact of vaccines at a national scale, it is critical to understand how their impact is distributed along population subgroups.

Methods:

We build a financial risk protection model to evaluate the impact of immunisation against measles, severe pneumococcal disease and severe rotavirus for birth cohorts vaccinated over 2016-2030 for three scenarios in 41 Gavi-eligible countries: no immunisation, current immunisation coverage forecasts and the current immunisation coverage enhanced with funding support. We distribute modelled disease cases per socioeconomic group and derive the number of cases of: (1) catastrophic health costs (CHCs) and (2) medical impoverishment.

Results:

In the absence of any vaccine coverage, the number of CHC cases attributable to measles, severe pneumococcal disease and severe rotavirus would be approximately 18.9 million, 6.6 million and 2.2 million, respectively. Expanding vaccine coverage would reduce this number by up to 90%, 30% and 40% in each case. More importantly, we find a higher share of CHC incidence among the poorest quintiles who consequently benefit more from vaccine expansion.

Conclusion:

Our findings contribute to the understanding of how vaccines can have a broad economic impact. In particular, we find that immunisation programmes can reduce the proportion of households facing catastrophic payments from out-of-pocket health expenses, mainly in lower socioeconomic groups. Thus, vaccines could have an important role in poverty reduction.

WEB: [10.1136/bmjgh-2017-000613](https://doi.org/10.1136/bmjgh-2017-000613)

IMPACT FACTOR: 3.47

CITED HALF-LIFE: 9.4

START EDITORIAL COMMENT: In this study of financial risk protection due to health interventions, the two metrics used to measure poverty were: household income (excluding healthcare costs) below the poverty line of \$1.90 per day and out of pocket healthcare costs larger than 20% of the household income. Three immunization coverage scenarios for measles, rotavirus and pneumococcal vaccines were compared: 1) no immunization; 2) current trends in immunization coverage; and 3) current trends including Gavi funding support for immunization expansion and the development of new vaccines. The study estimated that vaccine coverage would reduce catastrophic health costs by 90% for measles, 30% for severe pneumococcal disease, and 40% for rotavirus compared to the no vaccine or current forecasts scenarios. Results from this study are relevant for decision makers focused on poverty reduction and those setting national priorities for financing immunizations.

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7. [A systematic review of hepatitis B screening economic evaluations in low- and middle-income countries.](#)

Wright CM, Boudarène L, Ha NT, Wu O, Hawkins N.

BMC Public Health. 2018 Mar 20;18(1):373.

PubMed ID: 29558894

ABSTRACT

BACKGROUND:

Chronic hepatitis B infection is a significant cause of morbidity and mortality worldwide; low- and middle-income countries (LMICs) are disproportionately affected. Economic evaluations are a useful decision tool to assess costs versus benefits of hepatitis B virus (HBV) screening. No published study reviewing economic evaluations of HBV screening in LMICs has been undertaken to date.

METHODS:

The following databases were searched from inception to 21 April 2017: MEDLINE, PubMed, EMBASE, CINAHL Plus, the Cochrane Library, Global Health and the Cost-effectiveness Analysis Registry. English-language studies were included if they assessed the costs against the benefits of HBV screening in LMICs. PROSPERO registration: CRD42015024391, 20 July 2015.

RESULTS:

Nine studies fulfilled the eligibility criteria. One study from Thailand indicated that adding hepatitis B immunoglobulin (HBIG) to HBV vaccination for newborns following screening of pregnant women might be cost-effective for some LMICs, though inadequate total funding and health infrastructure were likely to limit feasibility. A similar study from China indicated a benefit to cost ratio of 2.7 from selective HBIG administration to newborns, if benefits were considered from a societal perspective. Of the two studies assessing screening amongst the general adult population, a single cost-benefit analysis from China found a benefit to cost ratio (BCR) of 1.73 with vaccination guided by HBV screening of adults aged 21-39, compared to 1.42 with vaccination with no screening, both from a societal perspective. Community-based screening of adults in The Gambia with linkage to treatment yielded an incremental cost per disability-adjusted life year averted of \$566 (in 2017 USD), less than two-times gross domestic product per capita for that country.

CONCLUSIONS:

Screening with 'catch-up' vaccination for younger adults yielded benefits above costs, and screening linked with treatment has shown cost-effectiveness that may be affordable for some LMICs. However, interpretation needs to account for total cost implications and further research in LMICs is warranted as there were only nine included studies and evidence from high-income countries is not always directly applicable.

WEB: [10.1186/s12889-018-5261-8](https://doi.org/10.1186/s12889-018-5261-8)

IMPACT FACTOR: 2.21

CITED HALF-LIFE: 4.30

START EDITORIAL COMMENT: The results of this systematic review support universal vaccination with no screening under current funding. With doubled funding, the systematic review supports HBsAg screening followed by HBeAg screening would be cost-effective and feasible. In countries where vaccination is both feasible and cost-effective, sufficient budget and logistical support is required to implement high quality services, especially in resource-limited settings. The authors also provide a novel recommendation to include DALYs averted as an outcome measure in future studies.

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8. [Planning for globally coordinated cessation of bivalent oral poliovirus vaccine: risks of non-synchronous cessation and unauthorized oral poliovirus vaccine use.](#)

Duintjer Tebbens RJ, Hampton LM, Thompson KM.

BMC Infect Dis. 2018 Apr 10;18(1):165.

PubMed ID: 29631539

ABSTRACT

BACKGROUND:

Oral polio vaccine (OPV) containing attenuated serotype 2 polioviruses was globally withdrawn in 2016, and bivalent OPV (bOPV) containing attenuated serotype 1 and 3 polioviruses needs to be withdrawn after the certification of eradication of all wild polioviruses to eliminate future risks from vaccine-derived polioviruses (VDPVs). To minimize risks from VDPVs, the planning and implementation of bOPV withdrawal should build on the experience with withdrawing OPV containing serotype 2 polioviruses while taking into account similarities and differences between the three poliovirus serotypes.

METHODS:

We explored the risks from (i) a failure to synchronize OPV cessation and (ii) unauthorized post-cessation OPV use for serotypes 1 and 3 in the context of globally-coordinated future bOPV cessation and compared the results to similar analyses for serotype 2 OPV cessation.

RESULTS:

While the risks associated with a failure to synchronize cessation and unauthorized post-cessation OPV use appear to be substantially lower for serotype 3 polioviruses than for serotype 2 polioviruses, the risks for serotype 1 appear similar to those for serotype 2. Increasing population immunity to serotype 1 and 3 poliovirus transmission using pre-cessation bOPV supplemental immunization activities and inactivated poliovirus vaccine in routine immunization reduces the risks of circulating VDPVs associated with non-synchronized cessation or unauthorized OPV use.

CONCLUSIONS:

The Global Polio Eradication Initiative should synchronize global bOPV cessation during a similar window of time as occurred for the global cessation of OPV containing serotype 2 polioviruses and should rigorously verify the absence of bOPV in immunization systems after its cessation.

WEB: [10.1186/s12879-018-3074-0](https://doi.org/10.1186/s12879-018-3074-0)

IMPACT FACTOR: 2.61

CITED HALF-LIFE: 3.80

START EDITORIAL COMMENT: The study of the risks of polio vaccine withdrawal included four distinct analyses: (1) an assessment of the vulnerability to vaccine derived polio after OPV cessation of the three serotypes; (2) an assessment of the vulnerability of different subpopulations to the spread of serotype 1 and 3 polioviruses under differing strategies of bOPV during the OPV to bOPV transition and bOPV cessation; (3) an assessment of the the implications and impacts of unauthorized OPV use post-cessation for all three serotypes; and (4) and assessment of the serotype 1 risks of unauthorized bOPV use under various assumptions about OPV and bOPV use until bOPV cessation. Findings suggest that synchronization of bOPV cessation would decrease the likelihood of the spread of OPV-related viruses. Risk-reduction measures would be particularly important for supply chain management and national policymakers who aim to reduce or eradicate polio globally.

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9. [The potential impact of a prophylactic vaccine for Ebola in Sierra Leone.](#)

Bodine EN, Cook C, Shorten M.

Math Biosci Eng. 2018 Apr 1;15(2):337-359.

PubMed ID: 29161839

ABSTRACT

The 2014 outbreak of Ebola virus disease (EVD) in West Africa was multinational and of an unprecedented scale primarily affecting the countries of Guinea, Liberia, and Sierra Leone. One of the qualities that makes EVD of high public concern is its potential for extremely high mortality rates (up to 90%). A prophylactic vaccine for ebolavirus (rVSV-ZEBOV) has been developed, and clinical trials show near-perfect efficacy. We have developed an ordinary differential equations model that simulates an EVD epidemic and takes into account (1) transmission through contact with infectious EVD individuals and deceased EVD bodies, (2) the heterogeneity of the risk of becoming infected with EVD, and (3) the increased survival rate of infected EVD patients due to greater access to trained healthcare providers. Using fitted parameter values that closely simulate the dynamics of the 2014 outbreak in Sierra Leone, we utilize our model to predict the potential impact of a prophylactic vaccine for the ebolavirus using various vaccination strategies including ring vaccination. Our results show that an rVSV-ZEBOV vaccination coverage as low as 40% in the general population and 95% in healthcare workers will prevent another catastrophic outbreak like the 2014 outbreak from occurring.

WEB: [10.3934/mbe.2018015](https://doi.org/10.3934/mbe.2018015)

IMPACT FACTOR: 0.84

CITED HALF-LIFE: 5.60

START EDITORIAL COMMENT: Unlike previous studies which used network-based transmission agent-based modeling or spatially explicit agent-based modeling to simulate Ebola epidemics within a population, this study developed a new model for analysis—an ordinary differential equations model. Based on the 2014 EVD outbreak, the model simulates a 2 year time period and allows for representations of vaccinations of susceptible individuals with the ability to move them from the recovered and non-infectious class, while vaccinated healthcare workers are moved into a separate class. The authors recommendation that the government in Sierra Leone should vaccinate at least 95% of healthcare workers and 40% of the general population could be actionable if supported with additional vaccine-specific research.

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10. [Evaluation of nationwide supplementary immunization in Lao People's Democratic Republic: Population-based seroprevalence survey of anti-measles and anti-rubella IgG in children and adults, mathematical modelling and a stability testing of the vaccine.](#)

Hachiya M, Miyano S, Mori Y, Vynnycky E, Keungsaneth P, Vongphrachanh P.

PLoS One. 2018 Mar 29;13(3):e0194931.

PubMed ID: 29596472

ABSTRACT

BACKGROUND:

Measles outbreaks have occurred in some countries despite supplementary immunization activities (SIA) using measles-containing vaccine with high vaccination coverage. We conducted a cross-sectional seroprevalence survey to estimate population immunity in Lao People's Democratic Republic where repeated mass immunization has failed to eliminate measles.

METHODS AND FINDINGS:

In this nationwide multistage cluster sampling survey conducted in 2014 based on probability proportionate to size sampling, blood samples were collected from 2,135 children and adults living in 52 randomly selected villages. Anti-measles and anti-rubella IgG were measured, and IgG prevalence was calculated. We applied mathematical modelling to estimate the number of cases of congenital rubella syndrome (CRS) in 2013 that were averted by the 2011 SIA. A stability testing was applied to the MR vaccine at 4°C, 25°C, and 35°C to examine stability differences between measles and rubella vaccine components. Measles IgG prevalence was significantly lower in the target age groups (5-21 years) of the 2011 SIA using a combination vaccine for measles and rubella vaccine (MR vaccine) than in young adults (22-39 years) (86.8% [95% CI: 83.0-90.6] vs. 99.0% [98.3-99.8]; $p < 0.001$), whereas rubella IgG prevalence was significantly higher (88.2% [84.5-91.8] vs. 74.6% [70.7-78.5]; $p < 0.001$). In the SIA target age groups, prevalence of measles IgG, but not rubella IgG, increased with age. CRS cases prevented in 2013 ranged from 16 [0-50] to 92 [32-180] if the force of infection had remained unchanged or had been reduced by 75%, respectively. In freeze-dried conditions, the measles vaccine component was more heat sensitive than the rubella component.

CONCLUSIONS:

Inconsistent IgG prevalence between measles and rubella in Lao PDR can be partly explained by different stability of the measles and rubella vaccine components under heat exposure. Suboptimal vaccine handling may cause insufficient immunogenicity for measles, which subsequently leads to an outbreak despite high SIA coverage, while direct evidence is lacking. Temperature monitoring of the vaccine should be conducted.

WEB: 10.1371/journal.pone.0194931

IMPACT FACTOR: 3.23

CITED HALF-LIFE: 2.70

START EDITORIAL COMMENT: This study included individuals aged 3-21 who would have been exposed to supplementary immunization activities (SIA) in 2011 resulting in a sample size of 2,135 subjects. Results showed immunity rates for measles and rubella IgG positivity among 5-14 and 15-21 year olds was 80.6% [95%CI: 74.8-86.3] and 92.7% [95%CI: 88.8-96.6], respectively. Findings suggest that vaccinating women of childbearing age is an effective control strategy for rubella and vaccinating children alone could potentially reduce the incidence of congenital rubella syndrome.

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APPENDIX

(((((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]) ("2018/3/15"[PDAT] : "2018/4/14"[PDAT]))

* April 30, 2018, this search of English language articles published between March 15, 2018 and April 14, 2018 and indexed by the US National Library of Medicine resulted in 253 unique manuscripts.

