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VACCINE DELIVERY RESEARCH DIGEST

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1. ONE YEAR OF CAMPAIGNS IN CAMEROON: EFFECTS ON ROUTINE HEALTH SERVICES.

Mounier-Jack S, Edengue JM, Lagarde M, Baonga SF, Ongolo-Zogo P.

Health Policy Plan. 2016 May 11. [Epub ahead of print]

PMID: 27175031

ABSTRACT

Background: Targeted campaigns have been reported to disrupt routine health services in low- and middle-income countries. The objective of this study was to evaluate the average effect of public health campaigns over 1 year on routine services such as antenatal care, routine vaccination and outpatient services.

Method: We collected daily activity data in 60 health facilities in two regions of Cameroon that traditionally undergo different intensities of campaign activity, the Centre region (low) and the Far North (high), to ascertain effects on routine services. For each outcome, we restricted our analysis to the public health centres for which good data were available and excluded private health facilities given their small number. We used segment-linear regression to account for the longitudinal nature of the data, and assessed whether the number of routine activities decreased in health facilities during periods when campaigns occurred. The analysis controlled for secular trends and serial correlation.

Results: We found evidence that vaccination campaigns had a negative impact on routine activities, decreasing outpatient visits when they occurred (Centre: -9.9%, P.0.079; Far North: -11.6%, P.0.025). The average negative effect on routine services [outpatient visits -18% (P.0.02) and antenatal consultations -70% [P.0.001]] was most pronounced in the Far North during 'intensive' campaigns that usually require high mobilization of staff.

Discussion: With an increasing number of interventions delivered by campaigns and in the context of elimination and eradication targets, these are important results for countries and agencies to consider. Achieving disease control targets hinges on ensuring high uptake of routine services. Therefore, we suggest that campaigns should systematically monitor 'impact on routine services', while also devising concrete strategies to mitigate potential adverse effects.

WEB: <http://dx.doi.org/10.1093/heapol/czw054>

IMPACT FACTOR: 3.47

CITED HALF-LIFE: 7.20

UW EDITORIAL COMMENT: Authors posit that differences between the effects in the North and Center may be due to poor quality data, predominance of the public system in the North versus both public and private options in Center, and more resource-intensive and better organized campaigns in the North. In the Far North, Meningococcal A (MenA) and polio campaigns were associated with a trend in less outpatient visits, less ANC visits, and less routine vaccination activities, although results (except effect of polio on ANC) were not statistically significant (Table 6). Of note, routine vaccination was also negatively affected by child health week campaigns. Authors did not find a difference in service delivery/utilization during campaigns in private facilities; the impact was limited to public facilities, although authors caution small sample size limits power. Table 7 provides the "estimated average effect of public health campaigns on service utilization." Confidence intervals around point estimates are not provided, thus precision isn't clear.

Although data are collected and compared based on daily campaign activities and utilization, the study provides estimates for average yearly utilization, to avoid overly large estimates of decline in utilization during campaigns that may be offset by relative increases/more utilization of services before/after the campaign.

Note that facilities with "poor quality data," were excluded from the analysis, and if such facilities were systematically different from facilities with higher quality data, then failing to include them in the analysis would bias results. For instance, facilities with poor data quality may also have been the most likely to have been overburdened with existing programs or have weaker organizational systems, which could make them more vulnerable to experiencing service delivery interruptions during campaigns.



2. PREDICTORS OF UPTAKE AND TIMELINESS OF NEWLY INTRODUCED PNEUMOCOCCAL AND ROTAVIRUS VACCINES, AND OF MEASLES VACCINE IN RURAL MALAWI: A POPULATION COHORT STUDY.

Mvula H, Heinsbroek E, Chihana M, Crampin AC, Kabuluzi S; VacSurv Consortium et al.

PLoS One. 2016;11(5):e0154997.

PMID: 2715261

ABSTRACT

Background: Malawi introduced pneumococcal conjugate vaccine (PCV13) and monovalent rotavirus vaccine (RV1) in 2011 and 2012 respectively, and is planning the introduction of a second dose measles vaccine (MV). We assessed predictors of availability, uptake and timeliness of these vaccines in a rural Malawian setting.

Methods: Commencing on the first date of PCV13 eligibility we conducted a prospective population based birth cohort study of 2,616 children under demographic surveillance in Karonga District, northern Malawi who were eligible for PCV13, or from the date of RV1 introduction both PCV13 and RV1. Potential predictors of vaccine uptake and timeliness for PCV13, RV1 and MV were analysed respectively using robust Poisson and Cox regression.

Results: Vaccine coverage was high for all vaccines, ranging from 86.9% for RV1 dose 2 to 95.4% for PCV13 dose 1. Median time delay for PCV13 dose 1 was 17 days (IQR 7–36), 19 days (IQR 8–36) for RV1 dose 1 and 20 days (IQR 3–46) for MV. Infants born to lower educated or farming mothers and those living further away from the road or clinic were at greater risk of being not fully vaccinated and being vaccinated late. Delays in vaccination were also associated with non-facility birth. Vaccine stock-outs resulted in both a delay in vaccine timeliness and in a decrease in completion of schedule.

Conclusion: Despite high vaccination coverage in this setting, delays in vaccination were common. We identified programmatic and socio-demographic risk factors for uptake and timeliness of vaccination. Understanding who remains most vulnerable to be unvaccinated allows for focused delivery thereby increasing population coverage and maximising the equitable benefits of universal vaccination programmes.

WEB: <http://dx.doi.org/10.1371/journal.pone.0154997>

IMPACT FACTOR: 3.23

CITED HALF-LIFE: 2.70

UW EDITORIAL COMMENT: In PCV13 birth cohorts, the time since the national introduction was a predictor of vaccination coverage (coverage higher at > 9 months than 0–3 months post introduction. Rainy season was associated with lower uptake than dry season, and more delays, which authors hypothesize was due to more frequent stock-outs. Geographic access was consistently associated with uptake and timeliness, across vaccines. Residential distance to the nearest clinic >1.5km was associated with lower uptake in PCV7. Lower RV1 uptake and total delay in vaccination were associated with being >1.5km from a road.

Of note, children that had a record of vaccine delivery, but no date of delivery, were included in “completeness” analysis but excluded from “timeliness” analysis. If those without a date of delivery were more likely to be vaccinated late, the estimated timeliness proportions could be over-representations. If those without a date recorded systematically differ from those with a date recorded, the factors associated with timeliness/delays will not be representative of factors associated with delay among the wider population.

Table 2 summarizes the predictors of low uptake for each vaccine.



3. MISSED OPPORTUNITIES IN FULL IMMUNIZATION COVERAGE: FINDINGS FROM LOW- AND LOWER-MIDDLE-INCOME COUNTRIES.

Restrepo-Mendez MC, Barros AJ, Wong KL, Johnson HL, Pariyo G, et al.

Glob Health Action. 2016;9:30963.

PMID: 27146444

ABSTRACT

Background: An estimated 23 million infants are still not being benefitted from routine immunization services. We assessed how many children failed to be fully immunized even though they or their mothers were in contact with health services to receive other interventions.

Design: Fourteen countries with Demographic and Health Surveys and Multiple Indicator Cluster Surveys carried out after 2000 and with coverage for DPT (Diphtheria-tetanus-pertussis) vaccine below 70% were selected. We defined full immunization coverage (FIC) as having received one dose of BCG (bacillus Calmette- Guerin), one dose of measles, three doses of polio, and three doses of DPT vaccines. We tabulated FIC against: antenatal care (ANC), skilled birth attendance (SBA), postnatal care for the mother (PNC), vitamin A supplementation (Vit A) for the child, and sleeping under an insecticide-treated bed-net (ITN). Missed opportunities were defined as the percentage of children who failed to be fully immunized among those receiving one or more other interventions.

Results: Children who received other health interventions were also more likely to be fully immunized. In nearly all countries, FIC was lowest among children born to mothers who failed to attend ANC, and highest when the mother had four or more ANC visits. Côte d'Ivoire presented the largest difference in FIC: 54 percentage points (pp) between having four or more ANC visits and lack of ANC. SBA was also related with higher FIC. For instance, the coverage in children without SBA was 36 pp lower than for those with SBA in Nigeria. The largest absolute difference on FIC in relation to PNC was observed for Ethiopia: 31 pp between those without and with PNC. FIC was also positively related with having received Vit A. The largest absolute difference was observed in DR Congo: 41 pp. The differences in FIC among whether or not children slept under ITN were much smaller than for other interventions. Haiti presented the largest absolute difference: 16 pp.

Conclusions: Our results show the need to develop and implement strategies to vaccinate all children who contact health services in order to receive other interventions.

WEB: <http://dx.doi.org/10.3402/gha.v9.30963>

IMPACT FACTOR: 1.93

CITED HALF-LIFE: 2.40

UW EDITORIAL COMMENT: The factors associated with missed opportunities differed by country, which authors explain may be due to the different intervention delivery used. FIC was associated with the receipt of other interventions, particularly having received repeat ANC visits. Authors postulate that EPI vaccination and other MNCH health services likely share many of the same barriers and facilities factors, such as geographic access to health services and cultural and socio-economic factors, that can encourage coverage. For example, complete ANC coverage and complete EPI coverage require multiple health facility visits, and thus mothers with better geographic access are more likely to complete service series for both series than mothers with poorer access.

Figure 1 summarizes full immunization coverage by according to other health care interventions, for each country. Figure 2 presents the percentage of children who failed to achieve FIC status despite having had contact with the health system (missed opportunities).



4. THE VALUE OF DEMONSTRATION PROJECTS FOR NEW INTERVENTIONS: THE CASE OF HUMAN PAPILLOMAVIRUS VACCINE INTRODUCTION IN LOW AND MIDDLE-INCOME COUNTRIES.

Howard N, Mounier-Jack S, Gallagher KE, Kabakama S, Griffiths UK, et al.

Hum Vaccin Immunother. 2016 May 9:0. [Epub ahead of print]

PMID: 27159786

ABSTRACT

Demonstration projects or pilots of new public health interventions aim to build learning and capacity to inform country-wide implementation. Authors examined the value of HPV vaccination demonstration projects and initial national programmes in low-income and lower-middle-income countries, including potential drawbacks and how value for national scale-up might be increased. Data from a systematic review and key informant interviews, analyzed thematically, included 55 demonstration projects and 8 national programmes implemented between 2007-2015 (89 years' experience). Initial demonstration projects quickly provided consistent lessons. Value would increase if projects were designed to inform sustainable national scale-up. Well-designed projects can test multiple delivery strategies, implementation for challenging areas and populations, and integration with national systems. Introduction of vaccines or other health interventions, particularly those involving new target groups or delivery strategies, needs flexible funding approaches to address specific questions of scalability and sustainability, including learning lessons through phased national expansion.

WEB: <http://dx.doi.org/10.1080/21645515.2016.1178433>

IMPACT FACTOR: 2.37

CITED HALF-LIFE: 1.80

UW EDITORIAL COMMENT: Authors explain that while demonstration projects can be informative in a preliminary stage, and need to be conducted in range of settings in order to be generalizable, the lessons learned with multiple projects can be quickly "saturated," and incremental knowledge gained can be minimal. They conclude that linking funding support with coverage indicators can be a disincentive for attempting or exploring novel delivery strategies, and instead encourages the use of known strategies. This limits the opportunity to gain new information. Authors caution that importantly, demonstration projects do not necessarily prepare countries for national scale-up of sustainable programs, and may in fact hinder future scale-up objectives. Demonstration projects were often conducted separately from routine services and failed to link with (and thus prepare for) integration with the national health systems. Additionally, regions selected for demonstration projects were often better-resourced and had more infrastructure and stakeholder buy-in than was typical overall in the country, and the delivery strategies selected for implementation were often more expensive and resource-intensive than countries would be capable of continuing to implement independently. Therefore, lessons learned were less applicable to the national context and projects often had limited application in preparing countries for implementation at scale.



5. EFFECT OF INTRODUCTION OF PENTAVALENT VACCINE AS REPLACEMENT FOR DIPHTHERIA-TETANUS- PERTUSSIS AND HEPATITIS B VACCINES ON VACCINATION UPTAKE IN A HEALTH FACILITY IN NIGERIA.

Sadoh AE, Nwaneri DU, Ogboghodo BC, Sadoh WE.

Vaccine. 2016 May 23;34(24):2722-8. Epub 2016 Apr 20.

PMID: 27108191

ABSTRACT

Background: The introduction of a new vaccine into an immunization programme may affect the immunization system negatively or positively. The aim of this study is to determine the effect of the introduction of the pentavalent vaccine as replacement for DTP and Hepatitis B vaccines on timeliness, completion of the schedule and dropout rates among children attending a health facility.

Methodology: This was a retrospective cohort study which involved extracting immunization records of children attending the Institute of Child Health Child Welfare Clinic between June 2011 and May 2013. Pentavalent vaccine was introduced as a replacement for DTP and Hepatitis B vaccines in June 2012. The uptake, timeliness and dropout rates of different vaccines in the immunization schedule were determined for children who commenced immunization in the pre, peri and post introduction phases.

Results: A total of 1110 children were studied – 190, 410 and 510 who commenced vaccination in the pre, peri and post introduction phases of the pentavalent vaccine respectively. Uptake was significantly higher for all vaccines in the post introduction phase compared to pre and peri introduction phases ($p < 0.001$). Completion of the immunization schedule by 60.2% of the children who commenced vaccination in the post introduction phase was higher than the 31.6% and 41.7% for the pre and peri introduction phases respectively ($p < 0.001$). Significantly more visits were required to complete the schedule in the peri introduction phase compared to the pre and post introduction phases $p < 0.001$. Delay in receipt of the three doses of DTP/PENTA was significantly longer in the peri introduction phase compared to pre and post introduction phases.

Conclusion: The introduction of pentavalent vaccine significantly improved uptake of vaccines and completion of the schedule but resulted in prolonged delay in receipt of vaccines during the introduction period.

WEB: <http://dx.doi.org/10.1016/j.vaccine.2016.04.026>

IMPACT FACTOR: 3.62

CITED HALF-LIFE: 5.50

UW EDITORIAL COMMENT: In addition to improvements in coverage pre vs. post for newly introduced vaccines, uptake improved for other vaccines in the schedule as well. Authors posit that seeking care for the new vaccine provided an opportunity to deliver other vaccinations that had previously been missed. Only BCG and Yellow fever had statistically significant differences in uptake from pre to peri introduction phases. Authors attribute vaccination delays during the peri introduction phase as primarily resulting from DTP stock-outs.



6. FACTORS ASSOCIATED WITH INCOMPLETE OR DELAYED VACCINATION ACROSS COUNTRIES: A SYSTEMATIC REVIEW.

Tauil Mde C, Sato AP, Waldman EA.

Vaccine. 2016 May 23;34(24):2635-43.

Epub 2016 Apr 22.

PMID: 27109562

ABSTRACT

Background: Despite the significant decline in the incidence of vaccine-preventable diseases as a result of increased vaccination coverage worldwide, there are many children with delayed vaccination and a marked heterogeneity in vaccination coverage. Objective: The aim of this study was to review factors that influence the adherence to childhood immunization schedule in different countries, especially related to socioeconomic conditions and health care system characteristics.

Methods: Pubmed and Web of Science databases were searched systematically for observational studies published in peer-reviewed journals in English, Spanish and Portuguese languages from January 1992 to June 2014. We included original articles that assessed vaccination schedule with at least three diphtheria-tetanus-pertussis, three polio and one measles vaccines in children aged 0–24 months.

Results: 491 articles were identified and 23 met the inclusion criteria and were reviewed. The most cited factors reported by countries with distinct characteristics were higher birth order (9 articles, 39.1%), and low maternal education/socioeconomic status (7 articles each one, 30.4%). Irregular monitoring by the health care services was reported by countries with “mainly private” health care system. Out-of-hospital birth, no reminder(s) about the next follow-up visit, and mother working outside the home were cited by countries with low/medium Human Development Index (HDI). Ethnicity, use of private health care services, and no health insurance were cited by countries with very high HDI. The role of migration on vaccination coverage was reported by three studies conducted in countries with distinct characteristics.

Conclusions: The factors are complex and driven by context. Overall, strengthening the contacts and relationships between the health care services and mothers with several children and families with low educational level/low socioeconomic status appear to be an important action to improve vaccination coverage.

WEB: <http://dx.doi.org/10.1016/j.vaccine.2016.04.016>

IMPACT FACTOR: 3.62

CITED HALF-LIFE: 5.50

UW EDITORIAL COMMENT: Studies were conducted in a range of heterogeneous settings in LMIC and high income countries; in places with different health care system structures (public, private, and mixed). Such heterogeneity in context makes inference across studies challenging. For example, whereas receiving vaccination through a public health care system was associated with delayed vaccination in the US, receiving care in the private sector was associated with delays/incompleteness in Canada. Note that authors describe the relationships between factors and coverage/delays as being indicative of relationships at the country-level, but the contributing studies are based primarily on individual-level exposure and outcome data. Most studies were not conducted among representative samples of the population within the countries, and therefore results should not be extrapolated to refer to a relationship that is consistent within that country/at the country level.

Most studies were cross-sectional in nature and may be limited by potential confounding factors that weren't adjusted for. Cross-sectional studies can be valuable for identifying correlates, but associations should not be interpreted as causal.

Table 2 lists the factors associated with delayed or incomplete vaccination (note that column headings say “completeness” and “timeliness” but the factors are actually associated with incompleteness and delay).



7. ASSESSING THE EFFECT OF MHEALTH INTERVENTIONS IN IMPROVING MATERNAL AND NEONATAL CARE IN LOW- AND MIDDLE-INCOME COUNTRIES: A SYSTEMATIC REVIEW.

Sondaal SF, Browne JL, Amoakoh-Coleman M, Borgstein A, Miltenburg AS, et al.

PLoS One. 2016;11(5):e0154664.

PMID: 2714439

ABSTRACT

Introduction: Maternal and neonatal mortality remains high in many low- and middle-income countries (LMIC). Availability and use of mobile phones is increasing rapidly with 90% of persons in developing countries having a mobile-cellular subscription. Mobile health (mHealth) interventions have been proposed as effective solutions to improve maternal and neonatal health. This systematic review assessed the effect of mHealth interventions that support pregnant women during the antenatal, birth and postnatal period in LMIC.

Methods: The review was registered with Prospero (CRD42014010292). Six databases were searched from June 2014–April 2015, accompanied by grey literature search using predefined search terms linked to pregnant women in LMIC and mHealth. Quality of articles was assessed with an adapted Cochrane Risk of Bias Tool. Because of heterogeneity in outcomes, settings and study designs a narrative synthesis of quantitative results of intervention studies on maternal outcomes, neonatal outcomes, service utilization, and healthy pregnancy education was conducted. Qualitative and quantitative results were synthesized with a strengths, weaknesses, opportunities, and threats analysis.

Results: In total, 3777 articles were found, of which 27 studies were included: twelve intervention studies and fifteen descriptive studies. mHealth interventions targeted at pregnant women increased maternal and neonatal service utilization shown through increased antenatal care attendance, facility-service utilization, skilled attendance at birth, and vaccination rates. Few articles assessed the effect on maternal or neonatal health outcomes, with inconsistent results.

Conclusion: mHealth interventions may be effective solutions to improve maternal and neonatal service utilization. Further studies assessing mHealth's impact on maternal and neonatal outcomes are recommended. The emerging trend of strong experimental research designs with randomized controlled trials, combined with feasibility research, government involvement and integration of mHealth interventions into the healthcare system is encouraging and can pave the way to improved decision making on best practice implementation of mHealth interventions.

WEB: <http://dx.doi.org/10.1371/journal.pone.0154664>

IMPACT FACTOR: 3.23

CITED HALF-LIFE: 2.70

UW EDITORIAL COMMENT: Two studies were identified that related mHealth interventions to childhood vaccination. A study in rural Thailand (Kaewkungwal, 2010) used text messaging from health care providers to mothers to remind them of upcoming EPI visits, and reported that a larger proportion presented on time for vaccination after the intervention than before (44.22% after, 34.49% before). Appointment messages was associated with almost 1.5-fold likelihood of on-time EPI (OR = 1.48 , 95% CI, 1.09–2.03).

A pilot study in urban India (Pathack, 2012) reported text message reminders for vaccination appointments to mothers, and reminders for missed appointments, were associated with improvement, although formal hypothesis tests weren't reported. Whereas total vaccination coverage at baseline was approximately 60%, after intervention 1st dose of BCG/HBV/OPV had 95%, 2nd dose 98%, and 3rd dose had 100% coverage. However, both studies used quasi-experimental, pre-post designs and may be subject to bias due to other changes in the health system or community over time, besides the intervention, which may also have influenced outcomes.

Table 3 summarizes different intervention components. Table 4 highlights strengths, weaknesses, opportunities and threats across acceptance, accessibility, and usability for mHealth interventions for a range of outcome targets.



8. LOCAL INNATE IMMUNE RESPONSES IN THE VACCINE ADJUVANT-INJECTED MUSCLE.

Liang F, Lorl K.

Clin Transl Immunology. 2016 Apr;5(4):e74.

PMID: 27195117

ABSTRACT

Inducing a high magnitude of antibodies, possibly in combination with T-cell responses that offer epitope breadth over prolonged periods of time is likely a prerequisite for effective vaccines against severe diseases such as HIV-1 infection, malaria and tuberculosis. A much better understanding of the innate immune mechanisms that are critical for inducing desired responses to vaccination would help in the design of novel vaccines. The majority of human vaccines are administered into the muscle. In this brief review, we focus on the initial innate immune events that occur locally at the site of intramuscular vaccine delivery, and how they are influenced by clinically approved vaccine adjuvants. In particular, the effects on cell mobilization, cell activation and vaccine antigen uptake are reviewed. Understanding how distinct adjuvants enhance and tailor vaccine responses would facilitate the selection of the best-suited adjuvant to improve vaccine efficacy to a given pathogen.

WEB: <http://dx.doi.org/10.1038/cti.2016.19>

IMPACT FACTOR: 1.43

CITED HALF-LIFE: 3.90

UW EDITORIAL COMMENT: Figure 1 depicts the local inflammatory responses induced by vaccine adjuvants in the injected muscle, and describes the first step in a “series of innate immune events” which lead to adaptive immune responses.



9. STRENGTHENING ROUTINE IMMUNIZATION IN AREAS OF NORTHERN NIGERIA AT HIGH RISK FOR POLIO TRANSMISSION DURING 2012-2014.

Ali D, Banda R, Mohammed A, Adagadzu J, Murele B, et al.

J Infect Dis. 2016 May 1;213 Suppl 3:S147-50. Epub 2016 Feb 24.

PMID: 26917576

ABSTRACT

Background: Following the 2012 declaration by World Health Organization (WHO) Regional Director for Africa and the WHO Executive Board to ramp up routine immunization (RI) activities, began to intensify activities to strengthen RI. This study assessed how the intensification of RI helped strengthen service delivery in local government areas (LGAs) of northern Nigeria at high risk for polio transmission.

Methods: A retrospective study was performed by analyzing RI administrative data and findings from supportive supervisory visits in 107 high-risk LGAs.

Results: Our study revealed that administrative coverage with 3rd dose of diphtheria-pertussis-tetanus vaccine in the 107 high risk LGAs improved from a maximum average coverage of 33% during the pre-intensification period of 2009–2011 to 74% during the post-intensification period of 2012–2014.

Conclusions: Routine immunization could be strengthened in areas where coverage is low, and RI has been identified to be weak when certain key routine activities are intensified.

WEB: <http://dx.doi.org/10.1093/infdis/jiv580>

IMPACT FACTOR: 6.00

CITED HALF-LIFE: 8.70

UW EDITORIAL COMMENT: Interventions to “intensify” RI included healthcare working training on RI and EPI, including surveillance, communication, and logistics; linking “microplans” for “Reaching Every Ward” and SIA microplans; increasing fixed and outreach immunization sessions; reinforcing supportive supervision for LGAs and facilities; increased monitoring; increasing demand creation; stock monitoring and supporting distribution to improve vaccine availability; and leveraging existing health strategies and activities (immunization-plus, local immunization days, maternal and newborn child health weeks, African vaccination weeks) as opportunities to increase RI.

In addition to RI intensification activities, other activities or changes in other factors over the observation time, might also account for changes observed in coverage and supervisory visits. For example, data and surveillance tool were introduced and health workers participated in data collection and management trainings as part of the intervention, and as a result may have improved or changed the way in which the outcomes were ascertained, such that documented differences in coverage may partially be explained by differences in measurement.

This article is part of a supplement in JID this month focusing on vaccination in the Nigerian context.



10. COST-EFFECTIVENESS OF MONOVALENT ROTAVIRUS VACCINATION OF INFANTS IN MALAWI: A POSTINTRODUCTION ANALYSIS USING INDIVIDUAL PATIENT-LEVEL COSTING DATA.

Bar-Zeev N, Tate JE, Pecenka C, Chikafa J, Mvula H; VACSURV Consortium et al.

Clin Infect Dis. 2016 May 1;62 Suppl 2:S220-8.

PMID: 27059360

ABSTRACT

Background: Rotavirus vaccination reduces childhood hospitalization in Africa, but cost-effectiveness has not been determined using real-world effectiveness and costing data. We sought to determine monovalent rotavirus vaccine cost-effectiveness in Malawi, one of Africa's poorest countries and the first Gavi-eligible country to report disease reduction following introduction in 2012.

Methods: This was a prospective cohort study of children with acute gastroenteritis at a rural primary health center, a rural first referral-level hospital and an urban regional referral hospital in Malawi. For each participant we itemized household costs of illness and direct medical expenditures incurred. We also collected Ministry of Health vaccine implementation costs. Using a standard tool (TRIVAC), we derived cost-effectiveness.

Results: Between 1 January 2013 and 21 November 2014, we recruited 530 children aged <5 years with gastroenteritis. Costs did not differ by rotavirus test result, but were significantly higher for admitted children and those with increased severity on Vesikari scale. Adding rotavirus vaccine to the national schedule costs Malawi \$0.42 per dose in system costs. Vaccine copayment is an additional \$0.20. Over 20 years, the vaccine program will avert 1 026 000 cases of rotavirus gastroenteritis, 78 000 inpatient admissions, 4300 deaths, and 136 000 disability-adjusted-life-years (DALYs). For this year's birth cohort, it will avert 54 000 cases of rotavirus and 281 deaths in children aged <5 years. The program will cost \$10.5 million and save \$8.0 million in averted healthcare costs. Societal cost per DALY averted was \$10, and the cost per rotavirus case averted was \$1.

Conclusions: Gastroenteritis causes substantial economic burden to Malawi. The rotavirus vaccine program is highly cost-effective. Together with the demonstrated impact of rotavirus vaccine in reducing population hospitalization burden, its cost-effectiveness makes a strong argument for widespread utilization in other low-income, high-burden settings

WEB: <http://dx.doi.org/10.1093/cid/civ1025>

IMPACT FACTOR: 8.886

CITED HALF-LIFE: 7.0

UW EDITORIAL COMMENT: The high cost-effectiveness of the program was robust to varying inputs and scenarios in the models. The inputs that had the largest impact included changing long-term GAVI support to a scenario where it ended 10 or 15 years after introduction, increased systems costs, absence of waning immunity beyond the first year of life, lower vaccine effectiveness over time from rotavirus genotype changes, lower case fatality rate, and lower costs of rotavirus care. Table 3 lists the input parameters used for estimation of disease burden, vaccine coverage, timeliness, and effectiveness. Although many of the inputs and assumptions were specific to the Malawian context, authors ran robust sensitivity analysis varying the levels and values of such inputs under a variety of "future scenarios," and thus assert that the overall finding of substantial cost-effectiveness may be applicable to other similar low-resource settings. Details of specific scenarios are outlined in Table 4.



APPENDIX: PUBMED 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]) AND ("2016/4/15"[PDAT] : "2016/05/14"[PDAT]))

* On June 1, 2016, this search of English language articles published between April 15, 2016 and May 14, 2016 and indexed by the US National Library of Medicine resulted in 249 unique manuscripts.

