VACCINE DELIVERY RESEARCH DIGEST

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

REPORT TO THE BILL & MELINDA GATES FOUNDATION

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1. **THE ACCEPTABILITY OF THREE VACCINE INJECTIONS GIVEN TO INFANTS DURING A SINGLE CLINIC VISIT IN SOUTH AFRICA.**

Tabana H, Dudley LD, Knight S, Cameron N, Mahomed H, et al.

ABSTRACT

BACKGROUND: The Expanded Programme on Immunisation (EPI) has increased the number of antigens and injections administered at one visit. There are concerns that more injections at a single immunisation visit could decrease vaccination coverage. We assessed the acceptability and acceptance of three vaccine injections at a single immunisation visit by caregivers and vaccinators in South Africa.

METHODS: A mixed methods exploratory study of caregivers and vaccinators at clinics in two provinces of South Africa was conducted. Quantitative and qualitative data were collected using questionnaires as well as observations of the administration of three-injection vaccination sessions.

RESULTS: The sample comprised 229 caregivers and 98 vaccinators. Caregivers were satisfied with the vaccinators' care (97 %) and their infants receiving immunisation injections (93 %). However, many caregivers, (86 %) also felt that three or more injections were excessive at one visit. Caregivers had limited knowledge of actual vaccines provided, and reasons for three injections. Although vaccinators recognised the importance of informing caregivers about vaccination, they only did this sometimes. Overall, acceptance of three injections was high, with 97 % of caregivers expressing willingness to bring their infant for three injections again in future visits despite concerns about the pain and discomfort that the infant experienced. Many (55 %) vaccinators expressed concern about giving three injections in one immunisation visit. However, in 122 (95 %) observed three-injection vaccination sessions, the vaccinators administered all required vaccinations for that visit. The remaining seven vaccinations were not completed because of vaccine stock-outs.

CONCLUSIONS: We found high acceptance by caregivers and vaccinators of three injections. Caregivers' poor understanding of reasons for three injections resulted from limited information sharing by vaccinators for caregivers. Acceptability of three injections may be improved through enhanced vaccinator-caregiver communication, and improved management of infants' pain. Vaccinator training should include evidence-informed ways of communicating with caregivers and reducing injection pain. Strategies to improve acceptance and acceptability of three injections should be rigorously evaluated as part of EPI's expansion in resource-limited countries.

WEB: http://dx.doi.org/10.1186/s12889-016-3324-2

IMPACT FACTOR: 2.26

CITED HALF-LIFE: 3.90

UW EDITORIAL COMMENT: Vaccinators recommend the following to address caregiver concerns about the multiple injections (PCV, Hepatitis B, DTaP-IPV/Hib) delivered at 6 and 14-week visits, to improve acceptability: providing additional education to caregivers about the rationale of multiple injections; decrease the number of injections given at one time by having oral formulations available or combing vaccines into fewer injections. Interestingly, among caregivers, perceiving 3 injections at one time as "too many" wasn't associated with receiving less than three injections, nor with failure to return for future injections, and most still reported high satisfaction with immunization. Although caregivers were concerned about receiving 3 injections in one visit, most preferred this to returning for additional visits. Similarly, although a large proportion of vaccinators felt 3 injections were too many, the vast majority, almost 95%, did administer all vaccinations due at the visit.

2. EVALUATION OF IMPACT OF MEASLES RUBELLA CAMPAIGN ON VACCINATION COVERAGE AND ROUTINE IMMUNIZATION SERVICES IN BANGLADESH.

Uddin MJ, Adhikary G, Ali MW, Ahmed S, Shamsuzzaman M, Odell C, et al.

ABSTRACT

BACKGROUND: Like other countries in Asia, measles-rubella (MR) vaccine coverage in Bangladesh is suboptimal whereas 90-95 % coverage is needed for elimination of these diseases. The Ministry of Health and Family Welfare (MOHFW) of the Government of Bangladesh implemented MR campaign in January-February 2014 to increase MR vaccination coverage. Strategically, the MOHFW used both routine immunization centres and educational institutions for providing vaccine to the children aged 9 months to <15 years. The evaluation was carried out to assess the impact of the campaign on MR vaccination and routine immunization services.

METHODS: Both quantitative and qualitative evaluations were done before and after implementation of the campaign. Quantitative data were presented with mean (standard deviation, SD) for continuous variables and with proportion for categorical variables. The overall and age- and sex-specific coverage rates were calculated for each region and then combined. Categorical variables were compared by chi-square statistics. Multiple logistic regression analysis were performed to estimate odds ratios (OR) and 95 % confidence intervals (CI) of coverage associated with covariates, with adjustment for other covariates. Qualitative data were analyzed using content analysis.

RESULTS: The evaluations found MR coverage was very low (<13 %) before the campaign and it rose to 90 % after the campaign. The pre-post campaign difference in MR coverage in each stratum was highly significant (p < 0.001). The campaign achieved high coverage despite relatively low level (23 %) of interpersonal communication with caregivers through registration process. Child registration was associated with higher MR coverage (OR 2.91, 95 % CI 1.91-4.44). Children who attended school were more likely to be vaccinated (OR 8.97, 95 % CI 6.17-13.04) compared to those who did not attend school. Children of caregivers with primary or secondary or higher education had higher coverage compared to children of caregivers with no formal education. Most caregivers mentioned contribution of the campaign in vaccination for the children not previously vaccinated.

CONCLUSIONS: The results of the evaluation indicated that the campaign was successful in terms of improving MR coverage and routine immunization services. The evaluation provided an important guideline for future evaluation of similar efforts in Bangladesh and elsewhere.

WEB: http://dx.doi.org/10.1186/s12879-016-1758-x

IMPACT FACTOR: 2.61

CITED HALF-LIFE: 3.80

UW EDITORIAL COMMENT: The top reasons cited by caregivers for failure to vaccinate, were child illness around the time of the vaccination campaign, fear of side effects, and not being aware of the campaign. It should be noted that "coverage" was defined as caregiver report of vaccination, and it is possible that the increased awareness and education provided as part of the campaign could potentially increase recall/report of previous vaccination.

While the campaign was reported to have positive effects on coverage of routine measles containing vaccine (MCV), the change in routine MCV coverage attributed to the campaign differed substantially by region, ranging from a 2% to 95% change.

From qualitative research, authors attribute the change in routine MCV coverage associated with the campaign as resulting from increased public awareness and acceptance, improved provider-caregiver communication, improved logistics, and strengthened inter-sectoral communication. To avoid interfering with other ongoing responsibilities, campaign activities were limited to weekends and week days were reserved for routine activities, although authors note that being cognizant of demands on health workers is essential. Authors also report that the campaigns resulted in increased opportunity for catch-up on other vaccinations.

3. COSTS OF INTRODUCING PNEUMOCOCCAL, ROTAVIRUS AND A SECOND DOSE OF MEASLES VACCINE INTO THE ZAMBIAN IMMUNISATION PROGRAMME: ARE EXPANSIONS SUSTAINABLE?

ABSTRACT

BACKGROUND: Introduction of new vaccines in low- and lower middle-income countries has accelerated since Gavi, the Vaccine Alliance was established in 2000. This study sought to (i) estimate the costs of introducing pneumococcal conjugate vaccine, rotavirus vaccine and a second dose of measles vaccine in Zambia; and (ii) assess affordability of the new vaccines in relation to Gavi's co-financing and eligibility policies.

METHODS: Data on 'one-time' costs of cold storage expansions, training and social mobilisation were collected from the government and development partners. A detailed economic cost study of routine immunisation based on a representative sample of 51 health facilities provided information on labour and vaccine transport costs. Gavi co-financing payments and immunisation programme costs were projected until 2022 when Zambia is expected to transition from Gavi support. The ability of Zambia to self-finance both new and traditional vaccines was assessed by comparing these with projected government health expenditures.

RESULTS: 'One-time' costs of introducing the three vaccines amounted to US$ 0.28 per capita. The new vaccines increased annual immunisation programme costs by 38%, resulting in economic cost per fully immunised child of US$ 102. Co-financing payments on average increased by 10% during 2008-2017, but must increase 49% annually between 2017 and 2022. In 2014, the government spent approximately 6% of its health expenditures on immunisation. Assuming no real budget increases, immunisation would account for around 10% in 2022. Vaccines represented 1% of government, non-personnel expenditures for health in 2014, and would be 6% in 2022, assuming no real budget increases.

CONCLUSION: While the introduction of new vaccines is justified by expected positive health impacts, long-term affordability will be challenging in light of the current economic climate in Zambia. The government needs to both allocate more resources to the health sector and seek efficiency gains within service provision.

WEB: http://dx.doi.org/10.1016/j.vaccine.2016.06.050

IMPACT FACTOR: 3.62

CITED HALF-LIFE: 5.50

UW EDITORIAL COMMENT: The introduction of the new vaccines is estimated to require 3-6% of non-personnel government health spending for vaccine and equipment costs. Authors point out this may be challenging to implement without potentially "crowding out" other important health investments.

Table 4 provides estimated annualized costs of introduction of MSD, PCV, and RV in Zambia, including both one-time and recurring costs, and reports cost per infant vaccinated, per capita, and total cost. Figure 3 provides estimates of the effect of MSD, PCV and RV introduction on immunization program costs, as a percent of government health expenditure, under different assumptions, predicted through 2022.

4. GAVI'S POLICY STEERS COUNTRY OWNERSHIP AND SELF-FINANCING OF IMMUNIZATION.

Henderson K, Gouglas D, Craw L.

ABSTRACT

This commentary examines the 2014 NIPH (Norwegian Institute of Public Health) evaluation of Gavi's co-financing policy and comments on the appropriateness of the subsequent and most significant policy changes taking effect in 2016.

WEB: http://dx.doi.org/10.1016/j.vaccine.2016.06.014

IMPACT FACTOR: 3.62

CITED HALF-LIFE: 5.50

UW EDITORIAL COMMENT: Authors note that country-level institutional capacity for priority-setting and decisions about introduction of vaccines using an evidence-based approach is often limited, and this capacity will be important as countries are faced with important decisions in the post-2015 revision phase. Authors also note domestic funding methods and sources of funding for co-financing is an import area of country-level ownership that will be impacted by 2015revisions.

Government expenditure on vaccines have not always kept pace with increases in the number of vaccine programs, although overall health spending has increased. Thus new and underused vaccines now account for a larger proportion of vaccine spending since co-financing commitments require additional domestic funding to account for the introduction of new vaccine programs.

Authors condone the "price-linked" approach for phase 1 countries, which under the new policy, "links" co-financing levels to the actual price of the vaccine program and requires countries to pay a proportion of the total cost based on the country co-financing levels. Authors posit that this approach will support a "smoother transition" to self-financing by helping to build awareness of cost and the financial implications in country-level decision-making.

Figure 1 depicts EPI program costs, summarizing number of co-financed vaccine programs, proportion of EPI budges dedicated to new and underused vaccines in a selection of GAVI countries from 2010- 2013, as additional (PCV and Rota) vaccines have been introduced. Authors note "caution is advised in interpreting these findings" due to limitations in country-level data availability and quality.

5. MHEALTH TO IMPROVE MEASLES IMMUNIZATION IN GUINEA-BISSAU: STUDY PROTOCOL FOR A RANDOMIZED CONTROLLED TRIAL.

Rossing E, Ravn H, Batista CS, Rodrigues A.

ABSTRACT

BACKGROUND: Recent studies have revealed a low measles vaccination (MV) rate in the Republic of Guinea-Bissau (West Africa) that has not increased in accordance with the increasing coverage of other vaccinations. Measles is the deadliest of all childhood rash/fever illnesses and spreads easily, implying that if the vaccination coverage is declining there is a significant risk of new measles outbreaks [27]. Meanwhile, mobile health (mHealth; the use of mobile phones for health interventions) has generated much enthusiasm, and shown potential in improving health service delivery in other contexts.

OBJECTIVE: The aim of this study is to evaluate the efficiency of mHealth as a tool for improving MV coverage while contributing to the mHealth evidence base.

METHODS: This study will take place at three health centers in different regions of Guinea-Bissau. Participants, defined as mothers of the children receiving the MV, will be enrolled when they arrive with their children at the health center to receive the Bacillus Calmette-Guérin vaccination, usually within one month of the child's birth. Enrolment will continue until a study population of 990 children has been reached. The participants will be randomly assigned to a control arm or one of two intervention arms. Each of the three groups will have 330 participants, distributed equally between health centers. Participants in the first intervention arm will receive a scheduled short message service (SMS) text message reminding them of the MV. Participants in the second intervention arm will receive a voice call in addition to the SMS message, while the control arm will receive no interventions. The MV is scheduled to be administered at 9 months of age. Although the vaccine would still be effective after 12 months, local policy in Guinea-Bissau prevents children aged >12 months from receiving the vaccination, and thus the study will follow-up with participants after the children reach 12 months of age. Children who have not yet received the MV will be offered vaccination by the project group.

RESULTS: The study will analyze the efficiency of the intervention by determining its overall effect on MV coverage and timeliness when children reach 12 months of age. The main analysis will be stratified by intervention group, health center, level of education, ethnic group, and role of the person receiving the text messages (eg, mother, father, other family member). Secondary outcomes include the average number of health center visits (with intention to obtain the MV) required before successful administration.

CONCLUSIONS: Despite the rapid proliferation of mHealth projects, only a small number have been evaluated in terms of direct links to health outcomes. This gap in knowledge requires solid evidence on which policy-makers can base decisions. This study aims to produce significant knowledge about mHealth implementation within a Sub-Saharan context while creating data-supported evidence.

WEB: http://dx.doi.org/10.2196/resprot.5968

IMPACT FACTOR: 3.43

CITED HALF-LIFE: 3.80

UW EDITORIAL COMMENT: Arm 1 will receive 2 SMS notifications delivered 3 days and 1 day before opportunities for measles vaccine delivery days occur, which could be either days in which MV is available at the local health center or via outreach activities. Arm 2 will receive the same SMS notifications, as well as voice call notifications. In both active arms, repeat messages and voice calls will be sent to notify participants of the next relevant measles vaccine opportunity if they did not attend the first opportunity, or if the opportunity was cancelled. Delivery of measles vaccine will be registered in an electronic system.

Inclusion criteria requires that potential participants have access to a cell phone, and thus the generalizability would be limited to caregivers of children from households with access to a phone. Authors also plan to collect information on reasons for vaccination/lack of vaccination and plan to conduct a cost-effectiveness analysis.

6. DOCUMENTATION OF POLIO ERADICATION INITIATIVE BEST PRACTICES: EXPERIENCE FROM WHO AFRICAN REGION.

Okeibunor J, Nshimirimana D, Nsubuga P, Mutabaruka E, Tapsoba L, et al.

ABSTRACT

BACKGROUND: The African Region is set to achieving polio eradication. During the years of operations, the Polio Eradication Initiative [PEI] in the Region mobilized and trained tremendous amount of manpower with specializations in surveillance, social mobilization, supplementary immunization activities [SIAs], data management and laboratory staff. Systems were put in place to accelerate the eradication of polio in the Region. Standardized, real-time surveillance and response capacity were established. Many innovations were developed and applied to reaching people in difficult and security challenged terrains. All of these resulted in accumulation of lessons and best practices, which can be used in other priority public health intervention if documented.

METHODS: The World Health Organization Regional Office for Africa [WHO/AFRO] developed a process for the documentation of these best practices, which was pretested in Uganda. The process entailed assessment of three critical elements [effectiveness, efficiency and relevance] five aspects [ethical soundness, sustainability, involvement of partners, community involvement, and political commitment] of best practices. A scored card which graded the elements and aspects on a scale of 0-10 was developed and a true best practice should score >50 points. Independent public health experts documented polio best practices in eight countries in the Region, using this process. The documentation adopted the cross-sectional design in the generation of data, which combined three analytical designs, namely surveys, qualitative inquiry and case studies. For the selection of countries, country responses to earlier questionnaire on best practices were screened for potential best practices. Another criterion used was the level of PEI investment in the countries.

RESULTS: A total of 82 best practices grouped into ten thematic areas were documented. There was a correlation between the health system performances with DPT3 as proxy, level of PEI investment in countries with number of best practice. The application of the process for the documentation of polio best practices in the African Region brought out a number of advantages. The triangulation of data collected using multiple methods and the collection of data from all levels of the programme proved useful as it provided opportunity for data verification and corroboration. It also helped to overcome some of the data challenge.

WEB: http://www.dx.doi.org/10.1016/j.vaccine.2016.05.058

IMPACT FACTOR: 3.62

CITED HALF-LIFE: 5.50

UW EDITORIAL COMMENT: Data were generated from program and policy reports, literature, interviews, focus groups discussions with community members and questionnaires with program implementers. Authors note including information from sources at the national, subnational and community levels was a strength of the process. Best practices fell into categories of integrated service delivery, human resources, contribution to RI, inter-sectoral collaboration, leadership and governance and surveillance and laboratory diagnostic capacity. Best practice "themes" included:
- Integration of PRI with other child survival strategies;
- Coordination and communication that benefited disease control programmes;
- Communicable disease surveillance;
- Epidemic preparedness and outbreak response;
- RI and new vaccine introduction;
- Public health workforce strengthening;
- Public health laboratory strengthening;
- Expanded partnerships with all sectors of the community to address public health issues;
- Development and adaptation of innovative public health approaches
- Data management for immunization and disease surveillance.

7. VACCINATION PROGRAM IN A RESOURCE-LIMITED SETTING: A CASE STUDY IN THE PHILIPPINES.

Chootipongchaivat S, Chantarastapornchit V, Kulpeng W, Ceria JA, Tolentino NI, et al.

ABSTRACT

OBJECTIVE: Implementing national-level vaccination programs involves long-term investment, which can be a significant financial burden, particularly in resource-limited settings. Although many studies have assessed the economic impacts of providing vaccinations, evidence on the positive and negative implications of human resources for health (HRH) is still lacking. Therefore, this study aims to estimate the HRH impact of introducing pneumococcal conjugate vaccine (PCV) using a model-based economic evaluation.

METHODS: This study adapted a Markov model from a prior study that was conducted in the Philippines for assessing the cost-effectiveness of 10-valent and 13-valent PCV compared to no vaccination. The Markov model was used for estimating the number of cases of pneumococcal-related diseases, categorized by policy options. HRH-related parameters were obtained from document reviews and interviews using the quantity, task, and productivity model (QTP model).

RESULTS: The number of full-time equivalent (FTE) of general practitioners, nurses, and midwives increases significantly if the universal vaccine coverage policy is implemented. A universal coverage of PCV13 - which is considered to be the best value for money compared to other vaccination strategies - requires an additional 380 FTEs for general practitioners, 602 FTEs for nurses, and 205 FTEs for midwives; it can reduce the number of FTEs for medical social workers, paediatricians, infectious disease specialists, neurologists, anaesthesiologists, radiologists, ultrasonologists, medical technologists, radiologic technologists, and pharmacists by 7, 17.9, 9.7, 0.4, 0.1, 0.7, 0.1, 12.3, 2, and 9.7, respectively, when compared to the no vaccination policy.

CONCLUSION: This is the first attempt to estimate the impact of HRH alongside a model-based economic evaluation study, which can be eventually applied to other vaccine studies, especially those which inform resource allocation in developing settings where not only financial resources but also HRH are constrained.

WEB: http://dx.doi.org/10.1016/j.vaccine.2016.08.014

IMPACT FACTOR: 3.62

CITED HALF-LIFE: 5.50

UW EDITORIAL COMMENT: Authors used a "quantity, task and productivity" (QTP) model, which uses a functional job analysis method that assess the required skills and time required to complete specific tasks or services, for estimating the required human resources. The model is used to estimate the resources needed or reduced under different policy options.

Authors estimate the impact on health care services resulting from prevention (vaccination) and treatment of pneumococcal-related disease (meningitis treatment, sepsis/bacteremia treatment, hospitalized pneumonia treatment, non-hospitalized pneumonia treatment, acute otitis media treatment) of adopting one of five policy options: no vaccination program; PCV10 with 25% coverage of vaccination program, PCV10 with 100% coverage of vaccination program, PCV13 with 25% coverage of vaccination program, PCV13 with 100% coverage of vaccination program. Table 3 and Figure 2 depict the relative increase or reduction in full time equivalent for each healthcare professional type required for the treatment of pneumococcal-related disease as the result of the implementation of the different PCV vaccination policies.

The HRH analysis results emphasize the substantial trade-offs in the different numbers and types of health care workers required under different policy options.

8. **STATE OF INEQUALITY IN DIPHTHERIA-TETANUS-PERTUSSIS IMMUNISATION COVERAGE IN LOW-INCOME AND MIDDLE-INCOME COUNTRIES: A MULTICOUNTRY STUDY OF HOUSEHOLD HEALTH SURVEYS.**

Hosseinpoor AR, Bergen N, Schlotheuber A, Gacic-Dobo M, Hansen PM, et al.

ABSTRACT

BACKGROUND: Immunisation programmes have made substantial contributions to lowering the burden of disease in children, but there is a growing need to ensure that programmes are equity-oriented. We aimed to provide a detailed update about the state of between-country inequality and within-country economic-related inequality in the delivery of three doses of the combined diphtheria, tetanus toxoid, and pertussis-containing vaccine (DTP3), with a special focus on inequalities in high-priority countries.

METHODS: We used data from the latest available Demographic and Health Surveys and Multiple Indicator Cluster Surveys done in 51 low-income and middle-income countries. Data for DTP3 coverage were disaggregated by wealth quintile, and inequality was calculated as difference and ratio measures based on coverage in richest (quintile 5) and poorest (quintile 1) household wealth quintiles. Excess change was calculated for 21 countries with data available at two timepoints spanning a 10-year period. Further analyses were done for six high-priority countries, those with low national immunisation coverage and/or high absolute numbers of unvaccinated children. Significance was determined using 95% CIs.

FINDINGS: National DTP3 immunisation coverage across the 51 study countries ranged from 32% in Central African Republic to 98% in Jordan. Within countries, the gap in DTP3 immunisation coverage suggested pro-rich inequality, with a difference of 20 percentage points or more between quintiles 1 and 5 for 20 of 51 countries. In Nigeria, Pakistan, Laos, Cameroon, and Central African Republic, the difference between quintiles 1 and 5 exceeded 40 percentage points. In 15 of 21 study countries, an increase over time in national coverage of DTP3 immunisation was realised alongside faster improvements in the poorest quintile than the richest. For example, in Burkina Faso, Cambodia, Gabon, Mali, and Nepal, the absolute increase in coverage was at least 2·0 percentage points per year, with faster improvement in the poorest quintile. Substantial economic-related inequality in DTP3 immunisation coverage was reported in five high-priority study countries (DR Congo, Ethiopia, Indonesia, Nigeria, and Pakistan), but not Uganda.

INTERPRETATION: Overall, within-country inequalities in DTP3 immunisation persist, but seem to have narrowed over the past 10 years. Monitoring economic-related inequalities in immunisation coverage is warranted to reveal where gaps exist and inform appropriate approaches to reach disadvantaged populations.

WEB: http://dx.doi.org/10.1016/S2214-109X(16)30141-3

IMPACT FACTOR: 3.61

CITED HALF-LIFE: 1.00

UW EDITORIAL COMMENT: Overall, coverage improved for most countries (17/21) and authors report improvement in the poor drove progress; the proportionate improvement in many countries was higher in lower than higher wealth quintiles. It is important to consider the absolute coverage level at baseline when interpreting "excess change", or additional change in coverage proportion experienced in one wealth quintile versus another, because quintiles with low absolute coverage at baseline have more opportunity for proportional change than quintiles with high coverage. Figure 2 depicts trends in national coverage, and categorizes countries by increase or decrease and whether change was "pro-poor" (larger absolute increase in poorest than richest quintile) or "pro-rich" (larger absolute increase in highest than lowest wealth quintile). Note analysis of change over time was only conducted among countries with available data, and may not be representative of trends overall. Figure 3 shows coverage estimates over time by wealth quintile in 6 high-priority countries (DR Congo, Ethiopia, Indonesia, Nigeria, Pakistan and Uganda).

9. **COST EFFECTIVENESS OF PNEUMOCOCCAL VACCINATION IN CHILDREN IN LOW- AND MIDDLE-INCOME COUNTRIES: A SYSTEMATIC REVIEW.**

Saokaew S, Rayanakorn A, Wu DB, Chaiyakunapruk N.

ABSTRACT

BACKGROUND: Although pneumococcal conjugate vaccines (PCVs) have been available for prevention of invasive pneumococcal disease (IPD) caused by Streptococcus pneumoniae (S. pneumoniae) for over a decade, their adoption into national immunization programmes in low- and middle-income countries (LMICs) is still limited. Economic evaluations (EEs) play a crucial role in support of evidence-informed decisions.

OBJECTIVE: This systematic review aims to provide a critical summary of EEs of PCVs and identify key drivers of EE findings in LMICs.

METHODS: We searched Scopus, ISI Web of Science, PubMed, Embase and Cochrane Central from their inception to 30 September 2015 and limited the search to LMICs. The search was undertaken using the search strings 'pneumococc* AND conjugat* AND (vaccin* OR immun*)' AND 'economic OR cost-effectiveness OR cost-benefit OR cost-utility OR cost-effectiveness OR cost-benefit OR cost-utility' in the abstract, title or keyword fields. To be included, each study had to be a full EE of a PCV and conducted for an LMIC. Studies were extracted and reviewed by two authors. The review involved standard extraction of the study overview or the characteristics of the study, key drivers or parameters of the EE, assumptions behind the analyses and major areas of uncertainty.

RESULTS: Out of 134 records identified, 22 articles were included. Seven studies used a Markov model for analysis, while 15 studies used a decision-tree analytic model. Eighteen studies performed a cost-utility analysis (CUA), with disability-adjusted life-years, quality-adjusted life-years or life-years gained as a measure of health outcome, while four studies focused only on cost-effectiveness analysis (CEA). Both CEA and CUA findings were provided by eight studies. Herd effects and serotype replacement were considered in 10 and 13 studies, respectively. The current evidence shows that both the 10-valent and 13-valent PCVs are probably cost effective in comparison with the 7-valent PCV or no vaccination. The most influential parameters were vaccine efficacy and coverage (in 16 of 22 studies), vaccine price (in 13 of 22 studies), disease incidence (in 11 of 22 studies), mortality from IPD and pneumonia (in 8 of 22 studies) and herd effects (in 4 of 22 studies). The findings were found to be supportive of the products owned by the manufacturers.

CONCLUSION: Our review demonstrated that an infant PCV programme was a cost-effective intervention in most LMICs (in 20 of 22 studies included). The results were sensitive to vaccine efficacy, price, burden of disease and sponsorship. Decision makers should consider EE findings and affordability before adoption of PCVs.

WEB: http://dx.doi.org/10.1007/s40273-016-0439-3

IMPACT FACTOR: 3.57

CITED HALF-LIFE: 8.20

UW EDITORIAL COMMENT: Studies included economic analysis of from the perspective of the payer, society, healthcare, and government, each of which considered different components for costs and included different inputs. The sponsorship for studies (industry or external) for each study is described and authors discuss differences in processes used and results reported for industry-sponsored versus independently-sponsored studies.

Table 2 lists vaccine prices and administrative costs of pneumococcal vaccination in children in low-income countries and middle-income countries classified by (GAVI) eligibility.

10. YELLOW FEVER IN ANGOLA AND BEYOND--THE PROBLEM OF VACCINE SUPPLY AND DEMAND.
Barrett AD.

N Engl J Med. 2016 Jul 28;375(4):301-3. Epub 2016 Jun 8.

PMID: 27276108

ABSTRACT

None available

WEB: http://dx.doi.org/10.1056/NEJMp1606997

IMPACT FACTOR: 13.90

CITED HALF-LIFE: 8.40

UW EDITORIAL COMMENT: The author proposes three potential approaches to addressing vaccine supply shortages in future: increasing the emergency stockpile on reserve; capping the amount of vaccine in a dose (via WHO regulation and policy); changing the manufacturing from embryonated chicken eggs to continuous cell line. Authors point out that current dosing provides substantially more vaccine than is necessary for protective immunity, and discuss diluting the vaccine in bulk during manufacturing, or using "dose-sparing" methods and delivering only a fraction of a dose to those getting vaccinated, as potential methods for increasing the number of people that could be protected given restrictions in amounts of available vaccine. Authors note that it would require research to better understand whether such dose-sparing methods were safe and effective in both adults and children.

(((((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 ("2016/6/15"[PDAT] : "2016/07/14"[PDAT]))

* On August 26, 2016, this search of English language articles published between July 15, 2016 and August 14, 2016 and indexed by the US National Library of Medicine resulted in 184 unique manuscripts.