

VACCINE DELIVERY RESEARCH DIGEST

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## 1. CAN THERMOSTABLE VACCINES HELP ADDRESS COLD-CHAIN CHALLENGES? RESULTS FROM STAKEHOLDER INTERVIEWS IN SIX LOW- AND MIDDLE-INCOME COUNTRIES.

Kristensen DD, Lorensen T, Bartholomew K, Villadiego S.

Vaccine. 2016 Feb 10;34(7):899-904.

PMID: 26778422

### ABSTRACT

**INTRODUCTION:** This study captures the perspectives of stakeholders at multiple levels of the vaccine supply chain regarding their assessment of challenges with storing vaccines within recommended temperature ranges and their perceptions on the benefits of having vaccines with improved stability, including the potential short-term storage and transport of vaccines in a controlled-temperature chain.

**METHODS:** Semi-structured interviews were undertaken with 158 immunization stakeholders in six countries. Interviewees included national decision-makers and advisors involved in vaccine purchasing decisions, national Expanded Programme on Immunization managers, and health and logistics personnel at national, subnational, and health facility levels.

**RESULTS:** Challenges with both heat and freeze-exposure of vaccines were recognized in all countries, with heat-exposure being a greater concern. Conditions leading to freeze-exposure including ice build-up due to poor refrigerator performance and improper icepack conditioning were reported by 53% and 28% of participants, respectively. Respondents were interested in vaccine products with improved heat/freeze-stability characteristics. The majority of those involved in vaccine purchasing indicated they would be willing to pay a US\$0.05 premium per dose for a freeze-stable pentavalent vaccine (68%) or a heat-stable rotavirus vaccine (59%), although most (53%) preferred not to pay the premium for a heat-stable pentavalent vaccine if the increased stability required changing from a liquid to a lyophilized product. Most respondents (73%) were also interested in vaccines labeled for short-term use in a controlled-temperature chain. The majority (115/158) recognized the flexibility this would provide during outreach or should cold-chain breaks occur. Respondents were also aware that possible confusion might arise and additional training would be required if handling conditions were changed for some, but not all vaccines.

**CONCLUSION:** Participating immunization stakeholders recognized the benefits of vaccine products with improved stability characteristics and of labeling vaccines for controlled-temperature chain use as a means to help address cold-chain issues in their immunization programs.

**WEB:** <http://dx.doi.org/10.1016/j.vaccine.2016.01.001>

**IMPACT FACTOR:** 3.62

**CITED HALF-LIFE:** 5.50

**UW EDITORIAL COMMENT:** Stakeholders included national decision makers and advisors; EPI managers; and health and logistics personnel at the national, regional, municipal and facility levels. Stakeholders were from both GAVI eligible and ineligible countries of Brazil, China, India, Peru, Philippines, Tanzania and Zanzibar.

The majority (73%) of participants reported there were circumstances in which a controlled temperature chain with labeling would be beneficial for temporary storage or transport of vaccines when refrigeration or ice wasn't available. The most common reason not to support use of controlled temperature chain (CTC), reported by 91% of those who weren't in support of CTC, was fear that having different procedures for different vaccines would be too confusing and would result in more wastage and safety/quality assurance problems if appropriate procedures weren't adhered to. Note that reports of estimated vaccine wastage and causes of wastage are based on the perceptions of stakeholders versus systematic evaluation of wastage due to expiration or damage from temperature.



## 2. POTENTIAL PUBLIC HEALTH IMPACT OF RTS,S MALARIA CANDIDATE VACCINE IN SUB-SAHARAN AFRICA: A MODELLING STUDY.

Sauboin CJ, Van Bellinghen LA, Van De Velde N, Van Vlaenderen I.

Malar J. 2015 Dec 23;14(1):524.

PMID: 26702637

### ABSTRACT

**BACKGROUND:** Adding malaria vaccination to existing interventions could help to reduce the health burden due to malaria. This study modelled the potential public health impact of the RTS,S candidate malaria vaccine in 42 malaria-endemic countries in sub-Saharan Africa.

**METHODS:** An individual-based Markov cohort model was constructed with three categories of malaria transmission intensity and six successive malaria immunity levels. The cycle time was 5 days. Vaccination was assumed to reduce the risk of infection, with no other effects. Vaccine efficacy was assumed to wane exponentially over time. Malaria incidence and vaccine efficacy data were taken from a Phase III trial of the RTS,S vaccine with 18 months of follow-up (NCT00866619). The model was calibrated to reproduce the malaria incidence in the control arm of the trial in each transmission category and published age distribution data. Individual-level heterogeneity in malaria exposure and vaccine protection was accounted for. Parameter uncertainty and variability were captured by using stochastic model transitions. The model followed a cohort from birth to 10 years of age without malaria vaccination, or with RTS,S malaria vaccination administered at age 6, 10 and 14 weeks or at age 6, 7-and-a-half and 9 months. Median and 95 % confidence intervals were calculated for the number of clinical malaria cases, severe cases, malaria hospitalizations and malaria deaths expected to be averted by each vaccination strategy. Univariate sensitivity analysis was conducted by varying the values of key input parameters.

**RESULTS:** Vaccination assuming the coverage of diphtheria-tetanus-pertussis (DTP3) at age 6, 10 and 14 weeks is estimated to avert over five million clinical malaria cases, 119,000 severe malaria cases, 98,600 malaria hospitalizations and 31,000 malaria deaths in the 42 countries over the 10-year period. Vaccination at age 6, 7-and-a-half and 9 months with 75 % of DTP3 coverage is estimated to avert almost 12.5 million clinical malaria cases, 250,000 severe malaria cases, 208,000 malaria hospitalizations and 65,400 malaria deaths in the 42 countries. Univariate sensitivity analysis indicated that for both vaccination strategies, the parameters with the largest impact on the malaria mortality estimates were waning of vaccine efficacy and malaria case-fatality rate.

**CONCLUSIONS:** Addition of RTS,S malaria vaccination to existing malaria interventions is estimated to reduce substantially the incidence of clinical malaria, severe malaria, malaria hospitalizations and malaria deaths across 42 countries in sub-Saharan Africa.

**WEB:** <http://malariajournal.biomedcentral.com/articles/10.1186/s12936-015-1046-z>

**IMPACT FACTOR:** 3.11

**CITED HALF-LIFE:** 4.00

**UW EDITORIAL COMMENT:** Varied parameters included transmission assumptions; immunity probability ; age-related susceptibility; waning of acquired immunity; asymptomatic infection probability; % severe cases; vaccine efficacy by age; and half-life by age. Fixed parameters included efficacy of dose; case fatality; maternal protection and waning; probability of recovery; access to treatment; and risk in treated and untreated. Authors estimate that RTS,S would provide measurable benefit in the first 1–4 years after introduction, but that due to delay in development of natural immunity, there would be a slight increase again in later years in high transmission areas, attributed to “the reduction of proportion of events averted in children less than 10 years of age compared with children under 5 years of age.” Authors predict that “higher efficacy obtained in five to 17-months age group would overcome the lower coverage with vaccination starting at 6 months.” Table 5 is estimated impact of each proposed regimen; Figure 5 is results of sensitivity analysis altering model parameter values in each scenario.



### 3. ASSESSMENT OF THE HEPATITIS B BIRTH DOSE VACCINATION PROGRAM, PAPUA NEW GUINEA, 2014.

Wiesen E, Lagani W, Sui G, Arava J, Reza S, Diorditsa S, Lin YC.

Vaccine. 2016 Jan 12;34(3):367-72.

PMID: 26620839

#### ABSTRACT

**INTRODUCTION:** Papua New Guinea (PNG) implemented hepatitis B birth dose (BD) vaccination in 2005 yet since that time coverage has remained low, allowing mother-to-child transmission to occur. We conducted a field assessment of the BD vaccination program to develop strategies for improving the BD coverage.

**METHODS:** We selected five provinces with higher hepatitis B prevalence and five with lower prevalence based on the results of a 2013 hepatitis B serological survey. Within each province, we interviewed district and provincial health officers, health workers, village volunteers, and caregivers from ten randomly selected health facilities. Data were collected on knowledge, practice, vaccine management and data recording/reporting. To identify enabling factors and barriers, we compared health facilities with higher BD coverage with those with lower coverage, and compared caregivers whose children received BD with those whose children did not.

**RESULTS:** Overall timely BD coverage was 31% and BD vaccination was taking place in 81% of sampled health facilities. Lack of cold chain and vaccine were the major reasons for not providing the BD. Insufficiencies in supervision, vaccine management, community outreach, and data management were identified as obstacles to achieving high timely hepatitis B BD coverage. good supervision, knowledge of hepatitis B and hepatitis B vaccination, antenatal care including information about the hepatitis B BD, provision of vaccine refrigerators in maternity wards, and outreach vaccination for home deliveries were associated with higher timely BD coverage.

**DISCUSSION:** Several steps will likely be effective in improving BD coverage: strengthening training and supervision among health workers and officers, educating caregivers on the benefits of the BD and delivery in health facilities, improving vaccine management, and improving data quality. Considerable effort and leadership will be needed to achieve these steps.

**WEB:** <http://dx.doi.org/10.1016/j.vaccine.2015.11.044>

**IMPACT FACTOR:** 3.62

**CITED HALF-LIFE:** 5.50

**UW EDITORIAL COMMENT:** This survey was conducted among a convenience sample of district and provincial health officers, health workers, village health volunteers, and caregivers. The purposive selection of districts with high and low burden; facilities with high and low coverage; and caregivers with vaccinated and unvaccinated children for comparison, rather than random selection of participants, make the overall summaries of knowledge, practice, management and recording that are reported lack representativeness of the overall distribution of such factors in the country as a whole.

Authors note supervision for BD, designated staff for BD, staff availability to vaccinate on weekends, educating mothers about hepatitis B during antenatal care and conducting BD outreach vaccination were all associated with being a high coverage facility. It should also be noted that health facilities with high and low BD coverage selected for comparison may have differed in other important, unmeasured ways that could influence coverage of BD vaccination, in addition to the knowledge, practice, vaccine management and recording methods considered.



#### 4. ACCESS TO ROUTINE IMMUNIZATION: A COMPARATIVE ANALYSIS OF SUPPLY-SIDE DISPARITIES BETWEEN NORTHERN AND SOUTHERN NIGERIA.

Eboreime E, Abimbola S, Bozzani F.

PLoS One. 2015;10(12):e0144876.

PMID: 26692215

##### ABSTRACT

**BACKGROUND:** The available data on routine immunization in Nigeria show a disparity in coverage between Northern and Southern Nigeria, with the former performing worse. The effect of socio-cultural differences on health-seeking behavior has been identified in the literature as the main cause of the disparity. Our study analyses the role of supply-side determinants, particularly access to services, in causing these disparities.

**METHODS:** Using routine government data, we compared supply-side determinants of access in two Northern states with two Southern states. The states were identified using criteria-based purposive selection such that the comparisons were made between a low-coverage state in the South and a low-coverage state in the North as well as between a high-coverage state in the South and a high-coverage state in the North.

**RESULTS:** Human resources and commodities at routine immunization service delivery points were generally insufficient for service delivery in both geographical regions. While disparities were evident between individual states irrespective of regional location, compared to the South, residents in Northern Nigeria were more likely to have vaccination service delivery points located within a 5km radius of their settlements.

**CONCLUSION:** Our findings suggest that regional supply-side disparities are not apparent, reinforcing the earlier reported socio-cultural explanations for disparities in routine immunization service uptake between Northern and Southern Nigeria. Nonetheless, improving routine immunisation coverage services require that there are available human resources and that health facilities are equitably distributed.

**WEB:** <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0144876>

**IMPACT FACTOR:** 3.23

**CITED HALF-LIFE:** 3.70

**UW EDITORIAL COMMENT:** Indicators of supply-side availability included % of facilities with at least two trained vaccinators; % facilities without stock-out of OPV or pentavalent vaccine in the reporting period (statistically significant); % of populations living within 5% of immunization service point (statistically significant).

Authors used available routine immunization coverage data from cross-sectional surveys collected annually, as well as policy documents, grey literature, and program documents from the national Primary Health Care (PHC) reviews. Two Northern and two Southern states were purposively selected to allow a comparison between a low-coverage and high-coverage states in the regions, from the subset of states that had participated in 2010 Nigeria Immunization Coverage Survey (NICS), and were judged to have “good quality” data. Note that states without and without “good quality” data likely differ in important ways that would influence their routine immunization practices and services, and thus the sampled sites may not be truly representative of high-performing and low-performing states.

Note that data availability from the different local government areas ranged drastically in different states, and assessments are based only on data that was available. It is possible that those areas without data available may be more likely to have less availability of supplies/vaccines than areas with data available, and thus selection bias could bias the availability reported in regions without high levels of data available, leading to an overestimate of the availability of supplies in regions where data was sparse. Likewise, the proportion of LGAs that conducted PHC reviews in each state varied, and we would anticipate that LGAs that conducted PHCs likely differ from LGAs that didn't conduct PHCs, and thus data would under-represent the practices in non-responding LGAs. This unequal availability of information could potentially bias the estimates of differences observed between states.



**5. SUCCESSIVE INTRODUCTION OF FOUR NEW VACCINES IN RWANDA: HIGH COVERAGE AND RAPID SCALE UP OF RWANDA'S EXPANDED IMMUNIZATION PROGRAM FROM 2009 TO 2013.**

Gatera M, Bhatt S, Ngabo F, Utumuliza M, Sibomana H et al.

Vaccine. 2015 Dec 15. [Epub ahead of print]

PMID: 26704259

**ABSTRACT**

As the pace of vaccine uptake accelerates globally, there is a need to document low-income country experiences with vaccine introductions. Over the course of five years, the government of Rwanda rolled out vaccines against pneumococcus, human papillomavirus, rotavirus, and measles & rubella achieving over 90% coverage for each. To carry out these rollouts, Rwanda's Ministry of Health engaged in careful review of disease burden information and extensive, cross-sectoral planning at least one year before introducing each vaccine. Rwanda's local leaders, development partners, civil society organizations and widespread community health worker network were mobilized to support communication efforts. Community health workers were also used to confirm target population size. Support from Gavi, UNICEF and WHO was used in combination with government funds to promote country ownership and collaboration. Vaccination was also combined with additional community-based health interventions. Other countries considering rapid consecutive or simultaneous rollouts of new vaccines may consider lessons from Rwanda's experience while tailoring the strategies used to local context.

**WEB:** <http://dx.doi.org/10.1016/j.vaccine.2015.11.076>

**IMPACT FACTOR:** 3.62

**CITED HALF-LIFE:** 5.50

**UW EDITORIAL COMMENT:** Key 'Lessons learned' include combining vaccination with other public health activities (pneumonia treatment); cooperation and financial commitment from international institutions and local government; collaboration between government and NGO partners; development of technical committees/working groups to determine feasibility and local need; community ownership and participation; ongoing monitoring and evaluation of logistical needs/constraints and rapid response to logistical needs. Figure 2 provides a summary of lessons learned in the domains of high level of government commitment; advanced planning; engaged community health workers; community engagement; and continual evaluation.



## 6. THE POTENTIAL ACCEPTABILITY OF INFANT VACCINATION AGAINST MALARIA: A MAPPING OF PARENTAL POSITIONS IN TOGO.

Kpanake L, Sorum PC, Mullet E.

Vaccine. 2016 Jan 20;34(4):408-12. Epub 2015 Dec 17.

PMID: 26706273

### ABSTRACT

**OBJECTIVE:** To map the acceptability to parents in Togo of infant vaccination against malaria.

**METHODS:** From July to October 2014, a study of 209 parents of infants in Togo was conducted to assess their willingness to have their infants vaccinated against malaria. Participants were exposed to 48 vignettes, designed using the main constructs of health-protective theories.

**RESULTS:** Five qualitatively different positions were found, which were labeled Neighbors' Attitude (5%), Cost Only (21%), Neighbors' Attitude and Cost (22%), Risk and Cost (33%), and Always Vaccinate (20%).

**CONCLUSION:** The diversity of parental positions regarding vaccinating their infants against malaria implies that malaria vaccination campaigns in Togo, and possibly in other sub-Saharan African countries, must not be "one size fits all," but must be tailored in design and implementation to match the diversity of parents' needs and views.

**WEB:** <http://dx.doi.org/10.1016/j.vaccine.2015.12.008>

**IMPACT FACTOR:** 3.62

**CITED HALF-LIFE:** 5.50

**UW EDITORIAL COMMENT:** Authors report that about 20% of the parents accept vaccination in all circumstances, regardless of the scenario provided regarding neighbors attitudes, cost, vaccine efficacy or disease severity. The patterns of decision-making within the scenarios depended on socio-demographic factors including age, gender, education, religion, and income. Note that the study was conducted with a convenience sample of caregivers who had brought their children to the study facility, and thus results represent the perceptions of similar populations who are engaged with the health system, and may not be generalizable to the larger community. Examples of the scenarios introduced to caregivers are provided in Appendix 1.





## 7. SOCIOCULTURAL DETERMINANTS OF ANTICIPATED ORAL CHOLERA VACCINE ACCEPTANCE IN THREE AFRICAN SETTINGS: A META-ANALYTIC APPROACH.

Sundaram N, Schaetti C, Merten S, Schindler C, Ali SM et al.

BMC Public Health. 2016 Jan 14;16(1):36.

PMID: 26762151

### ABSTRACT

**Background:** Controlling cholera remains a significant challenge in Sub-Saharan Africa. In areas where access to safe water and sanitation are limited, oral cholera vaccine (OCV) can save lives. Establishment of a global stockpile for OCV reflects increasing priority for use of cholera vaccines in endemic settings. Community acceptance of vaccines, however, is critical and sociocultural features of acceptance require attention for effective implementation. This study identifies and compares sociocultural determinants of anticipated OCV acceptance across populations in Southeastern Democratic Republic of Congo, Western Kenya and Zanzibar.

**Methods:** Cross-sectional studies were conducted using similar but locally-adapted semi structured interviews among 1095 respondents in three African settings. Logistic regression models identified sociocultural determinants of OCV acceptance from these studies in endemic areas of Southeastern Democratic Republic of Congo (SE-DRC), Western Kenya (W-Kenya) and Zanzibar. Meta-analytic techniques highlighted common and distinctive determinants in the three settings.

**Results:** Anticipated OCV acceptance was high in all settings. More than 93 % of community respondents overall indicated interest in a no-cost vaccine. Higher anticipated acceptance was observed in areas with less access to public health facilities. In all settings awareness of cholera prevention methods (safe food consumption and garbage disposal) and relating ingestion to cholera causation were associated with greater acceptance. Higher age, larger households, lack of education, social vulnerability and knowledge of oral rehydration solution for self-treatment were negatively associated with anticipated OCV acceptance. Setting-specific determinants of acceptance included reporting a reliable income (W-Kenya and Zanzibar, not SE-DRC). In SE-DRC, intention to purchase an OCV appeared unrelated to ability to pay. Rural residents were less likely than urban counterparts to accept an OCV in W-Kenya, but more likely in Zanzibar. Prayer as a form of self-treatment was associated with vaccine acceptance in SE-DRC and W-Kenya, but not in Zanzibar.

**Conclusions:** These cholera-endemic African communities are especially interested in no-cost OCVs. Health education and attention to local social and cultural features of cholera and vaccines would likely increase vaccine coverage. High demand and absence of insurmountable sociocultural barriers to vaccination with OCVs indicate potential for mass vaccination in planning for comprehensive control or elimination.

**WEB:** <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4712562/>

**IMPACT FACTOR:** 2.26

**CITED HALF-LIFE:** 3.90

**UW EDITORIAL COMMENT:** Fig. 1 provides the anticipated oral cholera vaccine acceptance rates in each setting at different price levels. Note that the study was conducted before mass vaccination of OCV started in Zanzibar, and thus at the time of the study, none of the countries were receiving mass vaccination. The sociodemographic characteristic associated with anticipated OCV acceptance were similar for the medium and high price points. At no-cost and low price, OCV was nearly universally accepted at all sites. The proportion reporting acceptance was lower for higher prices across settings, although the proportion accepting at each price point was different across settings. The sociodemographic factors associated with acceptance varied by country and price point. While many such characteristics were associated with acceptance, such factors are not easily addressed with public health programs or interventions. Of note, the study found that knowledge of ORS was negatively associated with willingness to pay, which authors attribute to individuals' assumption that if cholera is treatable, it may be considered less risky or less of a priority for prevention.



## 8. HEALTH WORKER PREFERENCES FOR PERFORMANCE-BASED PAYMENT SCHEMES IN A RURAL HEALTH DISTRICT IN BURKINA FASO.

Ye M, Diboulo E, Kagone M, Sie A, Sauerborn R, Loukanova S.

Glob Health Action. 2016;9:29103.

PMID: 26739784

### ABSTRACT

**Background:** One promising way to improve the motivation of healthcare providers and the quality of healthcare services is performance-based incentives (PBIs) also referred as performance-based financing. Our study aims to explore healthcare providers' preferences for an incentive scheme based on local resources, which aimed at improving the quality of maternal and child health care in the Nouna Health District.

**Design:** A qualitative and quantitative survey was carried out in 2010 involving 94 healthcare providers within 34 health facilities. In addition, in-depth interviews involving a total of 33 key informants were conducted at health facility levels.

**Results:** Overall, 85% of health workers were in favour of an incentive scheme based on the health district's own financial resources (95% CI: [71.91; 88.08]). Most health workers (95 and 96%) expressed a preference for financial incentives (95% CI: [66.64; 85.36]) and team-based incentives (95% CI: [67.78; 86.22]), respectively. The suggested performance indicators were those linked to antenatal care services, prevention of mother-to-child human immunodeficiency virus transmission, neonatal care, and immunization.

**Conclusions:** The early involvement of health workers and other stakeholders in designing an incentive scheme proved to be valuable. It ensured their effective participation in the process and overall acceptance of the scheme at the end. This study is an important contribution towards the designing of effective PBI schemes.

**WEB:** <http://dx.doi.org/10.3402/gha.v9.29103>

**IMPACT FACTOR:** 1.93

**CITED HALF-LIFE:** 2.40

**UW EDITORIAL COMMENT:** The incentive scheme developed was to pool a portion of individual health workers' per diem money earned from trainings and participation in optional workshops, into a district fund. District administration would also contribute to this fund with other sources of funding, such as awards from donors. The fund is then used to provide incentives to the staff based on performance in a set of pre-determined indicators which were selected during a convening that included relevant stakeholders at all levels, including health workers, policymakers and regional health administrators and managers. Vaccination coverage targets were among the primary health indicators selected. This included those considered to be "in health worker control": newborns fully immunized with BCG, polio, DPT, measles, yellow fever, hepatitis, and meningitis, and those considered to be "out of health worker control": tetanus immunization coverage of pregnant women. This study was formative research conducted to inform a multi-part project that will develop, implement and evaluate a performance-based financing scheme for MCH services overall.



## 9. SELF-ENFORCING REGIONAL VACCINATION AGREEMENTS.

Klepac P, Megiddo I, Grenfell BT, Laxminarayan R.

J R Soc Interface. 2016 Jan;13(114).

PMID: 26790996

### ABSTRACT

In a highly interconnected world, immunizing infections are a transboundary problem, and their control and elimination require international cooperation and coordination. In the absence of a global or regional body that can impose a universal vaccination strategy, each individual country sets its own strategy. Mobility of populations across borders can promote free-riding, because a country can benefit from the vaccination efforts of its neighbours, which can result in vaccination coverage lower than the global optimum. Here we explore whether voluntary coalitions that reward countries that join by cooperatively increasing vaccination coverage can solve this problem. We use dynamic epidemiological models embedded in a game-theoretic framework in order to identify conditions in which coalitions are self-enforcing and therefore stable, and thus successful at promoting a cooperative vaccination strategy. We find that countries can achieve significantly greater vaccination coverage at a lower cost by forming coalitions than when acting independently, provided a coalition has the tools to deter free-riding. Furthermore, when economically or epidemiologically asymmetric countries form coalitions, realized coverage is regionally more consistent than in the absence of coalitions.

**WEB:** <http://dx.doi.org/10.1098/rsif.2015.0907>

**IMPACT FACTOR:** 3.92

**CITED HALF-LIFE:** 4.65

**UW EDITORIAL COMMENT:** The study focused on “strongly immunizing infections” and vaccines that infer strong immunity, because of the more complicated nature of considerations required for more rapidly evolving pathogens for which infection and vaccination may have less consistent and stable influences on immunity.

Authors consider vaccination costs (including program implementation and operation costs) and assume an exponential increase in cost with higher coverage, and relate this to “infection costs” that include direct and indirect costs of disease, including morbidity, mortality and productivity loss.

Figure 3 provides model-derived estimated costs and coverage for three different potential cross-border control scenarios: no travel restrictions; expensive travel restrictions; and inexpensive travel restrictions, on “coupled countries” influenced by neighbors. Figure 4 provides model-derived estimates of costs, coverage and prevalence for example countries, for a range of different coalition sizes and levels of cooperation (from non-cooperative to fully cooperative).

Applying economic game theory approaches to the context of the global public health realm of vaccination benefits and costs, authors conclude that coalitions between countries improve population protection at lower costs than if countries work independently. Authors note that enforcement measures, such as sanctions, would be essential to prevent countries from abstaining and taking advantage of protection conferred by neighboring countries.



## 10. FEASIBILITY AND ACCEPTABILITY OF DELIVERING ADOLESCENT HEALTH INTERVENTIONS ALONGSIDE HPV VACCINATION IN TANZANIA.

Watson-Jones D, Lees S, Mwanga J, Neke N, Changalucha J et al.

Health Policy Plan. 2016 Jan 14. [Epub ahead of print]

PMID: 26768827

### ABSTRACT

**Background:** Human papillomavirus (HPV) vaccination offers an opportunity to strengthen provision of adolescent health interventions (AHI). We explored the feasibility of integrating other AHI with HPV vaccination in Tanzania.

**Methods:** A desk review of 39 policy documents was preceded by a stakeholder meeting with 38 policy makers and partners. Eighteen key informant interviews (KIIs) with health and education policy makers and district officials were conducted to further explore perceptions of current programs, priorities and AHI that might be suitable for integration with HPV vaccination.

**Results:** Fourteen school health interventions (SHI) or AHI are currently being implemented by the Government of Tanzania. Most are delivered as vertical programmes. Coverage of current programs is not universal, and is limited by financial, human resource and logistic constraints. Limited community engagement, rumours, and lack of strategic advocacy has affected uptake of some interventions, e.g. tetanus toxoid (TT) immunization. Stakeholder and KI perceptions and opinions were limited by a lack of experience with integrated delivery and AHI that were outside an individual's area of expertise and experience. Deworming and educational sessions including reproductive health education were the most frequently mentioned interventions that respondents considered suitable for integrated delivery with HPV vaccine.

**Conclusions:** Given programme constraints, limited experience with integrated delivery and concern about real or perceived side-effects being attributed to the vaccine, it will be very important to pilot-test integration of AHI/SHI with HPV vaccination. Selected interventions will need to be simple and quick to deliver since health workers are likely to face significant logistic and time constraints during vaccination visits.

**WEB:** <http://heapol.oxfordjournals.org/content/early/2016/01/13/heapol.czv119.short?rss=1>

**IMPACT FACTOR:** 3.47

**CITED HALF-LIFE:** 3.55

**UW EDITORIAL COMMENT:** Authors report that experience with offering school-based tetanus toxoid (TT) vaccination programs for adolescent girls provided valuable lessons learned that might be relevant to other adolescent vaccination programs. One of the barriers to school-based TT included rumors that the vaccine was intended to cause infertility, since it was only being given to girls. Another challenge was reaching girls who were absent or where out of school, since drop-out rates are high, although early vaccination (before drop-outs were common) and Child Health Days were proposed as a methods to reach out-of-school girls.

Stakeholders generally agreed that HPV vaccination should be part of a more integrated adolescent health package that targets both boys and girls and reaches more than one grade level with multiple interventions, rather than a singularly focused intervention, to optimize resources and efficiency. However, there wasn't clear agreement on the most appropriate interventions to package. Interventions considered included deworming and vision screening, "life style education", oral hygiene education; diet and exercise education; sexual and reproductive health education, and TT vaccination. Table 2 provides the list of interventions considered and their stakeholder ratings.



## APPENDIX: PUBMED SEARCH TERMS

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(((((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 ("2015/12/15"[PDAT] : "2016/01/14"[PDAT]))

\*On January 21, 2016, this search of English language articles published between December 15, 2015 and January 14, 2016 and indexed by the US National Library of Medicine resulted in 180 unique manuscripts.

