VACCINE DELIVERY RESEARCH DIGEST

UNIVERSITY OF WASHINGTON GLOBAL HEALTH START PROGRAM
REPORT TO THE BILL AND MELINDA GATES FOUNDATION

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1. **Reducing routine vaccination dropout rates: evaluating two interventions in three Kenyan districts, 2014**

Haji A, Lowther S, Ngan'ga Z, Gura Z, Tabu C, Sandhu H, et al.
BMC Public Health. 2016 Feb 16;16(1):152.
PMID: 26880141

ABSTRACT

BACKGROUND: Globally, vaccine preventable diseases are responsible for nearly 20 % of deaths annually among children <5 years old. Worldwide, many children dropout from the vaccination program, are vaccinated late, or incompletely vaccinated. We evaluated the impact of text messaging and sticker reminders to reduce dropouts from the vaccination program.

METHODS: The evaluation was conducted in three selected districts in Kenya: Machakos, Langata and Njoro. Three health facilities were selected in each district, and randomly allocated to send text messages or provide stickers reminding parents to bring their children for second and third dose of pentavalent vaccine, or to the control group (routine reminder) with next appointment date indicated on the well-child booklet. Children aged <12 months presenting for their first dose of pentavalent vaccine were enrolled. A dropout was defined as not returning for vaccination ≥2 weeks after scheduled date for third dose of pentavalent vaccine. We calculated dropout rate as a percentage of the difference between first and third pentavalent dose.

RESULTS: We enrolled 1,116 children; 372 in each intervention and 372 controls between February and October 2014. Median age was 45 days old (range: 31-99 days), and 574 (51 %) were male. There were 136 (12 %) dropouts. Thirteen (4 %) children dropped out among those who received text messages, 60 (16 %) among who received sticker reminders, and 63 (17 %) among the controls. Having a caregiver with below secondary education [Odds Ratio (OR) 1.8, 95 % Confidence Interval (CI) 1.1-3.2], and residing >5 km from health facility (OR 1.6, CI 1.0-2.7) were associated with higher odds of dropping out. Those who received text messages were less likely to drop out compared to controls (OR 0.2, CI 0.04-0.8). There was no statistical difference between those who received stickers and controls (OR 0.9, CI 0.5-1.6).

CONCLUSION: Text message reminders can reduce vaccination dropout rates in Kenya. We recommend the extended implementation of text message reminders in routine vaccination services

WEB: http://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-016-2823-5

IMPACT FACTOR: 2.26

CITED HALF-LIFE: 3.90

UW EDITORIAL COMMENT: Note that although this cluster RCT randomized at the level of cluster (health facility) the outcome was evaluated on the level of the individual child without accounting for clustering by facility, which could lead to incorrect estimates of standard errors/variability around point estimates for association. The authors report that SMS reminders were associated with 20% lower likelihood of missing follow-up vaccinations, but OR for missed vaccinations in SMS group compared with control was OR 0.2, 95% CI 0.04–0.8, so in fact those who received SMS were 80% less likely to miss follow-up vaccinations, relative to control group. Authors report that some of the primary reasons for missing follow-up vaccinations, as reported by caretakers, include that child taken to another facility 39 (35 %); or child died 2 (2 %). The estimated proportion of children with missed vaccinations on follow-up may thus have been overestimated, as children who received vaccination from another facility did not actually fail to get vaccinated, and those who died were not at risk of getting vaccinated, and should have been removed from the denominator.

Age of child at first pentavalent dose >56 days (OR 2.2, CI 1.3– 3.1), residing a distance ≥ 5 km from facility (OR 1.6, CI :1.1– 2.3), were associated with higher odds of missed vaccinations, but note that analysis to identify co-factors of missed follow-up "breaks" the randomization scheme and thus analysis may be subject to potential confounding, or bias.

The study was conducted in districts with high drop-out rates, within regions without security concerns and which were geographically accessible to investigators/health facility, and the study population was limited to those with a phone; thus extrapolation of results should be limited to similar settingsand populations

2. **Meeting Postpartum Women's Family Planning Needs Through Integrated Family Planning and Immunization Services: Results of a Cluster-Randomized Controlled Trial in Rwanda**

Dulli LS, Eichleay M, Rademacher K, Sortijas S, Nsengiyumva T.

Glob Health Sci Pract. 2016 Mar 25;4(1):73-86.
PMID: 27016545

ABSTRACT

OBJECTIVE: The primary objective of this study was to test the effectiveness of integrating family planning service components into infant immunization services to increase modern contraceptive method use among postpartum women.

METHODS: The study was a separate sample, parallel, cluster-randomized controlled trial. Fourteen randomly selected primary health facilities were equally allocated to intervention (integrated family planning and immunization services at the same time and location) and control groups (standard immunization services only). At baseline (May-June 2010), we interviewed postpartum women attending immunization services for their infant aged 6 to 12 months using a structured questionnaire. A separate sample of postpartum women was interviewed 16 months later after implementation of the experimental health service intervention. We used linear mixed regression models to test the study hypothesis that postpartum women attending immunization services for their infants aged 6-12 months in the intervention facilities will be more likely to use a modern contraceptive method than postpartum women attending immunization services for their infants aged 6-12 months in control group facilities.

RESULTS: We interviewed and analyzed data for 825 women from the intervention group and 829 women from the control group. Results showed the intervention had a statistically significant, positive effect on modern contraceptive method use among intervention group participants compared with control group participants (regression coefficient, 0.15; 90% confidence interval [CI], 0.04 to 0.26). Although we conducted a 1-sided significance test, this effect was also significant at the 2-sided test with alpha=.05. Among those women who did not initiate a contraceptive method, awaiting the return of menses was the most common reason cited for non-use of a method. Women in both study groups overwhelmingly supported the concept of integrating family planning service components into infant immunization services (97.9% in each group), and service data collected during the intervention period did not indicate that the intervention had any negative effect on infant immunization service uptake.

CONCLUSION: Integrating family planning service components into infant immunization services can be an acceptable and effective strategy to increase contraceptive use among postpartum women. Additional research is needed to examine the extent to which this integration strategy can be replicated in other health care settings. Future research should also explore persistent misconceptions regarding the relationship between return of menses and return to fertility during the postpartum period.

WEB: http://dx.doi.org/10.9745/GHSP-D-15-00291

IMPACT FACTOR: 0.0

CITED HALF-LIFE: 0.0

UW EDITORIAL COMMENT: The intervention consisted of 1) Concise messages delivered during group education sessions; 2) Distribution of brochure during group education; 3) One-on-one screening for pregnancy risk of women attending immunization education, by immunization provider; 4) Convenient offer of family planning services to women attending immunization at the same facility and on the same day as immunization services, by referral to onsite family planning provider. A “difference in differences” analysis found the intervention arm experienced an 8% increase in use, while control group experienced a 7% decrease in use over follow-up, resulting in a 15 percentage point difference in the change from baseline to follow-up, comparing intervention to control groups. To ensure sustainability/fidelity, ministry of Health personnel conducted routine monitoring and supportive supervision visits.

3. **Role of the private sector in vaccination service delivery in India: evidence from private-sector vaccine sales data, 2009-12**

Sharma A, Kaplan WA, Chokshi M, Zodpey SP.

Health Policy Plan. 2016 Mar 14. [Epub ahead of print]
PMID: 26976803

ABSTRACT

BACKGROUND: India's Universal Immunization Programme (UIP) provides basic vaccines free-of-cost in the public sector, yet national vaccination coverage is poor. The Government of India has urged an expanded role for the private sector to help achieve universal immunization coverage. We conducted a state-by-state analysis of the role of the private sector in vaccinating Indian children against each of the six primary childhood diseases covered under India's UIP.

METHODS: We analyzed IMS Health data on Indian private-sector vaccine sales, 2011 Indian Census data and national household surveys (DHS/NFHS 2005-06 and UNICEF CES 2009) to estimate the percentage of vaccinated children among the 2009-12 birth cohort who received a given vaccine in the private sector in 16 Indian states. We also analyzed the estimated private-sector vaccine shares as function of state-specific socio-economic status.

RESULTS: Overall in 16 states, the private sector contributed 4.7% towards tuberculosis (Bacillus Calmette-Guérin (BCG)), 3.5% towards measles, 2.3% towards diphtheria-pertussis-tetanus (DPT3) and 7.6% towards polio (OPV3) overall (both public and private sectors) vaccination coverage. Certain low income states (Uttar Pradesh, Rajasthan, Madhya Pradesh, Orissa, Assam and Bihar) have low private as well as public sector vaccination coverage. The private sector's role has been limited primarily to the high income states as opposed to these low income states where the majority of Indian children live. Urban areas with good access to the private sector and the ability to pay increases the Indian population's willingness to access private-sector vaccination services.

CONCLUSION: In India, the public sector offers vaccination services to the majority of the population but the private sector should not be neglected as it could potentially improve overall vaccination coverage. The government could train and incentivize a wider range of private-sector health professionals to help deliver the vaccines, especially in the low income states with the largest birth cohorts. We recommend future studies to identify strengths and limitations of the public and private health sectors in each Indian state.

WEB: http://dx.doi.org/10.1093/heapol/czw008

IMPACT FACTOR: 3.47

CITED HALF-LIFE: 7.20

UW EDITORIAL COMMENT: In estimating coverage attributable to the private sector, authors assumed that every vaccination course initiated in the private sector was completed, and that it was completed in the private sector, and also that there was no vaccine wastage, thus their estimates are “best-case scenario” since it is likely there is some wastage and that follow-up/completion is less than perfect. In analysis not accounting for per capita income, state-specific per-capita income, urbanization and percentage births in private-sector health facilities were all positively associated with private sector shares of all four vaccines, and the percentage of population living below the poverty line seemed to have a negative trend with private sector shares for three of the four vaccines, although this was not statistically significant for OPV (Table 4). With adjustment for per capita income, the magnitude of the association between private-sector vaccine shares and each of the previously identified state-specific socioeconomic factors was substantially smaller. Overall, authors report that higher state-specific income is associated with larger private-sector vaccine share, although for OPV this association is weak Figure 1-3 show the association between private-sector BCG, measles and DPT3 vaccine shares and state-specific per-capita income for each state’s 2009–12 birth cohort. Table 3 reports the median overall (public and private) vaccination coverage rates and private-sector vaccine shares among the vaccinated, by state “coverage cluster,” eg. high overall coverage and high private sector share; low overall coverage and high private sector share; low overall coverage and low private sector share; and high overall coverage and low private sector share, for each of the four vaccines.

Analysis were conducted on the state level, and should not be extrapolated to individual-level inference.

4. **Routine Immunization Consultant Program in Nigeria: A Qualitative Review of a Country-Driven Management Approach for Health Systems Strengthening**
O'Connell M, Wonodi C.
Glob Health Sci Pract. 2016 Mar 25;4(1):29-42.
PMID: 27016542

ABSTRACT
BACKGROUND: Since 2002, the Nigerian government has deployed consultants to states to provide technical assistance for routine immunization (RI). RI consultants are expected to play a role in supportive supervision of health facility staff, capacity building, advocacy, and monitoring and evaluation.
METHODS: We conducted a retrospective review of the RI consultant program's strengths and weaknesses in 7 states and at the national level from June to September 2014 using semi-structured interviews and online surveys. Participants included RI consultants, RI program leaders, and implementers purposively drawn from national, state, and local government levels. Thematic analysis was used to analyze qualitative data from the interviews, which were triangulated with results from the quantitative surveys.
FINDINGS: At the time of data collection, 23 of 36 states and the federal capital territory had an RI consultant. Of the 7 states visited during the study, only 3 states had present and visibly working consultants. We conducted 84 interviews with 101 participants across the 7 states and conducted data analysis on 70 interviews (with 82 individuals) that had complete data. Among the full sample of interview respondents (N=101), most (66%) were men with an average age of 49 years (±5.6), and the majority were technical officers (63%) but a range of other roles were also represented, including consultants (22%), directors (13%), and health workers (2%). Fifteen consultants and 44 program leaders completed the online surveys. Interview data from the 3 states with active RI consultants indicated that the consultants' main contribution was supportive supervision at the local level, particularly for collecting and using RI data for decision making. They also acted as effective advocates for RI funding. In states without an RI consultant, gaps were highlighted in data management capacity and in monitoring of RI funds. Program design strengths: the broad terms of reference and autonomy of the consultants allowed work to be tailored to the local context; consultants were often integrated into state RI teams but could also work independently when necessary; and recruitment of experienced consultants with strong professional networks, familiarity with the local context, and ability to speak the local language facilitated advocacy efforts. Key programmatic challenges were related to inadequate and inconsistent inputs (salaries, transportation means, and dedicated office space) and gaps in communication between consultants and national leadership and in management of consultants, including lack of performance feedback, lack of formal orientation at inception, and no clear job performance targets.
CONCLUSIONS: While weaknesses in managerial and material inputs affect current performance of RI consultants in Nigeria, the design of the RI consultant program employs a unique problem-focused, locally led model of development assistance that could prove valuable in strengthening the capacity of the government to implement such technical assistance on its own. Despite the lack of uniform deployment and implementation of RI consultants across the country, some consultants appear to have contributed to improved RI services through supportive supervision, capacity building, and advocacy.

WEB: http://dx.doi.org/10.9745/GHSP-D-15-00209

IMPACT FACTOR: 0.0

CITED HALF-LIFE: 0.0

UW EDITORIAL COMMENT: Table 3 summarizes results from an online survey of RI program leaders. Most program leaders reported that the RI consultants were present and active, that that their interactions with them were helpful, and that the RI program had a large influence in improving immunization services in their state (73%, 77%, and 70% respectively). Leaders were less aware of and/or confident in the methods for performance evaluation of RI consultants; 68% reported that no one evaluated RI consultant performance and 59% reported not knowing whether there were performance targets for consultants. This study did not attempt to assess whether there was an association between deployment of an RI consultant or consultant performance, and immunization coverage or immunization program performance.

5. **HPV vaccine introduction in Rwanda: Impacts on the broader health system**
Torres-Rueda S, Rulisa S, Burchett HE, Mivumbi NV, Mounier-Jack S.
Sex Reprod Healthc. 2016 Mar;7:46-51.
PMID: 26826045

ABSTRACT
OBJECTIVES: Rwanda was the first country in Africa to introduce the human papillomavirus (HPV) vaccine. This was achieved through multi-year school-based campaigns. Our study evaluated the impact of the HPV vaccine introduction on the country's immunisation programme and health system.
METHODS: Thirty key informants were interviewed at national and district levels, and in participating schools. Twenty-seven health facilities completed a questionnaire exploring the effects of the new vaccine introduction on six health system building blocks, as defined by the World Health Organization. Routine service activity data were collected during a 90-day period around the introduction.
RESULTS: Routine vaccination activities were not disrupted during the delivery, likely due to a strong Expanded Program on Immunization, appropriate planning and a well-resourced operation. Opportunities were seized to co-deliver other interventions targeted at children and adolescents, such as health promotion. Collaboration with the Ministry of Education was strengthened at national level. Although there were some temporary increases in staff workload, no major negative effects were reported.
CONCLUSION: Despite its delivery through school-based campaigns, the HPV vaccine integrated well into the immunisation programme and health system. The introduction had no major negative effects. Some opportunities were seized to expand services and collaborations.

WEB: http://dx.doi.org/10.1016/j.srhc.2015.11.006

IMPACT FACTOR: 1.25

CITED HALF-LIFE: 0.00

UW EDITORIAL COMMENT: Authors assessed the impact of the vaccine introduction on each of the WHO health systems building blocks domains: Service delivery; Health workforce; Health information system; Medical products, vaccines and technologies; Financing and sustainability; Leadership/governance. To assess whether HPV vaccine introduction interrupted delivery of other key health services, authors compared routine service delivery data before, during and after HPV vaccine introduction to determine if there were changes in delivery of the third dose of the diphtheria-pertussistetanus- hepatitis B-Haemophilus influenzae type b combined vaccine ("pentavalent" vaccine) and antenatal care (ANC) visits, which were used as indicators of the impact of the new vaccine on service delivery activities. This observational data is informative, but without a comparison group of similar facilities over the same time period, it is difficult to determine conclusively whether of not the intervention was associated with any difference in service provision. Authors report the following noteworthy findings: the decision to co-deliver other interventions at the school-level alongside the HPV vaccine, and the continuation of routine services during the delivery of the campaign. Authors point out that it was not possible to determine whether during the HPV vaccination campaign there was a change in the number of children vaccinated with the pentavalent vaccine or number of ANC visits, because data was limited to higher-level indicators of service delivery versus numbers of children reached, although programmatic data indicate such services continued uninterrupted.

6. **Potential impact of spatially targeted adult tuberculosis vaccine in Gujarat, India**
Shrestha S, Chatterjee S, Rao KD, Dowdy DW.
J R Soc Interface. 2016 Mar;13(116).
PMID: 27009179

ABSTRACT
Some of the most promising vaccines in the pipeline for tuberculosis (TB) target adolescents and adults. Unlike for childhood vaccines, high-coverage population-wide vaccination is significantly more challenging for adult vaccines. Here, we aimed to estimate the impact of vaccine delivery strategies that were targeted to high-incidence geographical 'hotspots' compared with randomly allocated vaccination. We developed a spatially explicit mathematical model of TB transmission that distinguished these hotspots from the general population. We evaluated the impact of targeted and untargeted vaccine delivery strategies in India-a country that bears more than 25% of global TB burden, and may be a potential early adopter of the vaccine. We collected TB notification data and conducted a demonstration study in the state of Gujarat to validate our estimates of heterogeneity in TB incidence. We then projected the impact of randomly vaccinating 8% of adults in a single mass campaign to a spatially targeted vaccination preferentially delivered to 80% of adults in the hotspots, with both strategies augmented by continuous adolescent vaccination. In consultation with vaccine developers, we considered a vaccine efficacy of 60%, and evaluated the population-level impact after 10 years of vaccination. Spatial heterogeneity in TB notification (per 100 000/year) was modest in Gujarat: 190 in the hotspots versus 125 in the remaining population. At this level of heterogeneity, the spatially targeted vaccination was projected to reduce TB incidence by 28% after 10 years, compared with a 24% reduction projected to achieve via untargeted vaccination-a 1.17-fold augmentation in the impact of vaccination by spatially targeting. The degree of the augmentation was robust to reasonable variation in natural history assumptions, but depended strongly on the extent of spatial heterogeneity and mixing between the hotspot and general population. Identifying high-incidence hotspots and quantifying spatial mixing patterns are critical to accurate estimation of the value of targeted intervention strategies.

WEB: http://dx.doi.org/10.1098/rsif.2015.1016

IMPACT FACTOR: 3.92

CITED HALF-LIFE: 4.40

UW EDITORIAL COMMENT: Authors point out that when TB was "perfectly homogeneous in a population with no mixing," STV was less effective than UTV, but that with larger amounts of heterogeneity and mixing, STV provided larger benefit (Figure 4). This trend did not depend on the migration rate nor vaccine efficacy assumptions. Authors point out that overall, there was a fairly low degree of spatial heterogeneity in the TB incidence at the level of TB unit, and thus the impact of spatial targeting was small. They explain that this may be due to three factors, as follows. First, that spatial resolution at the TU level "may not be sufficiently fine to detect substantive heterogeneity that occurs at smaller scales" and thus they recommend that to make a STV strategy effective, it may be necessary to target sub-populations "with finer geographical resolution," which they note may be much more challenging logistically to implement. Second, the "designation of TUs…was designed to optimize provision of TB services by allocating resources in a more equitable manner" and thus the impact of the STV may actually be reduced. Third, incentives for reaching case detection targets were being provided during the period of the study when notifications were being assessed, and thus the reports of TB incidence may have been "more uniform than was actually the case." Authors caution that the benefits of spatial targeting must be "weighed against the feasibility of delivering a vaccine at the spatial scale on which such heterogeneity is observed" and note that determining the appropriate spatial scale for quantifying heterogeneity, including an assessment of the movement and mixing of people in TB hotspots, is essential for future research.

Table 1 describes the model parameters, inputs, and assumed ranges for inputs. Figure 4 reports the estimated relative benefit of spatially targeted versus untargeted TB vaccine, as a function of spatial heterogeneity and short-term mixing. Figure 3 reports the estimated reduction in TB incidence from UTV and STV campaigns, and the population estimated to be vaccine-protected in the first 20 years, for different mixing level assumptions.

7. **Contribution of Environmental Surveillance Toward Interruption of Poliovirus Transmission in Nigeria, 2012-2015**

Johnson Muluh T, Hamisu AW, Craig K, Mkanda P, Andrew E, Adeniji J et al.

J Infect Dis. 2016 Feb 21. [Epub ahead of print]
PMID: 26908747

ABSTRACT

BACKGROUND: Cases of paralysis caused by poliovirus have decreased by >99% since the 1988 World Health Assembly's resolution to eradicate polio. The World Health Organization identified environmental surveillance (ES) of poliovirus in the poliomyelitis eradication strategic plan as an activity that can complement acute flaccid paralysis (AFP) surveillance. This article summarizes key public health interventions that followed the isolation of polioviruses from ES between 2012 and 2015.

METHODS: The grap method was used to collect 1.75 L of raw flowing sewage every 2-4 weeks. Once collected, samples were shipped at 4°C to a polio laboratory for concentration. ES data were then used to guide program implementation.

RESULTS: From 2012 to 2015, ES reported 97 circulating vaccine-derived polioviruses (cVDPV2) and 14 wild polioviruses. In 2014 alone, 54 cVDPV type 2 cases and 1 WPV type 1 case were reported. In Sokoto State, 58 cases of AFP were found from a search of 9426 households. A total of 2 252 059 inactivated polio vaccine and 2 460 124 oral polio vaccine doses were administered to children aged <5 year in Borno and Yobe states.

CONCLUSIONS: This article is among the first from Africa that relates ES findings to key public health interventions (mass immunization campaigns, inactivated polio vaccine introduction, and strengthening of AFP surveillance) that have contributed to the interruption of poliovirus transmission in Nigeria.

WEB: http://jid.oxfordjournals.org/content/213/suppl_3/S131.long

IMPACT FACTOR: 6.00

CITED HALF-LIFE: 8.70

UW EDITORIAL COMMENT: Authors summarize the public health activities initiated in response to the identification of poliovirus in ES, including mass immunization campaigns, inactivated polio vaccine introduction, and AFP surveillance, as well as to cases identified, and vaccine doses administered. Table 1 provides a list of locations where poliovirus was identified from ES sewage collection sites, and the type and number of doses of vaccine distributed in response. This article is part of a special supplement in JID this month about poliovirus in Nigeria.

8. **Development of the World Health Organization Measles Programmatic Risk Assessment Tool Using Experience from the 2009 Measles Outbreak in Namibia**

Kriss JL, De Wee RJ, Lam E, Kaiser R, Shibeshi ME, Ndevaetela EE et al.

Risk Anal. 2016 Feb 19. [Epub ahead of print]
PMID: 26895314

ABSTRACT: In the World Health Organization (WHO) African region, reported measles cases decreased by 80% and measles mortality declined by 88% during 2000-2012. Based on current performance trends, however, focused efforts will be needed to achieve the regional measles elimination goal. To prioritize efforts to strengthen implementation of elimination strategies, the Centers for Disease Control and Prevention and WHO developed a measles programmatic risk assessment tool to identify high-risk districts and guide and strengthen program activities at the subnational level. This article provides a description of pilot testing of the tool in Namibia using comparisons of high-risk districts identified using 2006-2008 data with reported measles cases and incidence during the 2009 outbreak. Of the 34 health districts in Namibia, 11 (32%) were classified as high risk or very high risk, including the district of Engela where the outbreak began in 2009. The district of Windhoek, including the capital city of Windhoek, had the highest overall risk score-driven primarily by poor population immunity and immunization program performance-and one of the highest incidences during the outbreak. Other high-risk districts were either around the capital district or in the northern part of the country near the border with Angola. Districts categorized as high or very high risk based on the 2006-2008 data generally experienced high measles incidence during the large outbreak in 2009, as did several medium- or low-risk districts. The tool can be used to guide measles elimination strategies and to identify programmatic areas that require strengthening.

WEB: http://dx.doi.org/10.1111/risa.12544

IMPACT FACTOR: 2.50

CITED HALF-LIFE: 9.40

UW EDITORIAL COMMENT: The tool was designed to identify regions at the sub-national level that were at high-risk of measles outbreak based on (1) population immunity, (2) surveillance quality, (3) program performance, and (4) threat assessment), to inform programmatic activities. Authors describe the relationship between regional classification of risk from 2006-2008 data using the tool, and the distribution of subsequent outbreaks/incidence in 2009. Figure 2 shows the geographic distribution of risk assessment score and subsequent cases during the 2009 outbreak. Appendix B is an analysis of the association between risk category and incidence, excluding regions with "high likelihood of inaccurate incidence," which shows no association between risk score and subsequent incidence in 2009 outbreak.

The risk assessment tool did not appropriately differentiate between districts at different levels of risk, based on incidence in the 2009 outbreak. There was no statistically significant association between risk score category in incidence in 2009 outbreak. Authors identify the lack of available data outside the country to inform the original risk score, which resulting in failing to account for the risk due to the influence of "spill-over" cases in neighboring countries, and the lack of adequate, high-quality surveillance and administrative data within the country to inform risk score in some regions, as major limitations of the tool.

9. **The 5As: A practical taxonomy for the determinants of vaccine uptake**
Thomson A, Robinson K, VallÃe-Tourangeau G.
Vaccine. 2016 Feb 17;34(8):1018-24.
PMID: 26672676

ABSTRACT
Suboptimal vaccine uptake in both childhood and adult immunisation programs limits their full potential impact on global health. A recent progress review of the Global Vaccine Action Plan stated that "countries should urgently identify barriers and bottlenecks and implement targeted approaches to increase and sustain coverage". However, vaccination coverage may be determined by a complex mix of demographic, structural, social and behavioral factors. To develop a practical taxonomy to organise the myriad possible root causes of a gap in vaccination coverage rates, we performed a narrative review of the literature and tested whether all non-socio-demographic determinants of coverage could be organised into 4 dimensions: Access, Affordability, Awareness and Acceptance. Forty-three studies were reviewed, from which we identified 23 primary determinants of vaccination uptake. We identified a fifth domain, Activation, which captured interventions such as SMS reminders which effectively nudge people towards getting vaccinated. The 5As taxonomy captured all identified determinants of vaccine uptake. This intuitive taxonomy has already facilitated mutual understanding of the primary determinants of suboptimal coverage within inter-sectorial working groups, a first step towards them developing targeted and effective solutions.

WEB: http://dx.doi.org/10.1016/j.vaccine.2015.11.065

IMPACT FACTOR: 3.62

CITED HALF-LIFE: 5.50

UW EDITORIAL COMMENT: The fifth domain, “Activation”, encompasses interventions that provide prompts or remainders, or address work-place policies. Authors describe the types of interventions that fit under the root cause of “Activation” as “interventions that made vaccination as easy as possible through facilitation of access, made it a net positive, rather than negative, experience with small incentives, made vaccination the default rather than a choice, or provided reminders.”

Although the objective of the study was to develop a taxonomy that was relevant globally, authors point out that the majority of the studies contributing were from research in well-resourced settings in the UK, USA and Australia.

Table 1 lists “Working definitions and contributing factors of the 5As”, including the “root cause” and description of the definition. Table 3 provides a summary of the contributing factors identified under each of the 5As dimensions, along with relevant references to studies. Table 4 is a comparison of the dimensions for the causes of a vaccination gap from existing taxonomies, including the Tailoring immunisation programs (TIP) (key issues), UNVACC (core problem areas), SAGE working group (determinants of vaccine hesitancy) and the 5As (root causes).

10. **Policy analysis for deciding on a malaria vaccine RTS,S in Tanzania**
Romore I, Njau RJ, Semali I, Mwisongo A, Ba Nguz A, Mshinda H et al.
Malar J. 2016 Mar 8;15(1):143.
PMID: 26956944

ABSTRACT:
BACKGROUND: Traditionally, it has taken decades to introduce new interventions in low-income countries. Several factors account for these delays, one of which is the absence of a framework to facilitate comprehensive understanding of policy process to inform policy makers and stimulate the decision-making process. In the case of the proposed introduction of malaria vaccines in Tanzania, a specific framework for decision-making will speed up the administrative process and shorten the time until the vaccine is made available to the target population.
METHODS: Qualitative research was used as a basis for developing the Policy Framework. Interviews were conducted with government officials, bilateral and multilateral partners and other stakeholders in Tanzania to assess malaria treatment policy changes and to draw lessons for malaria vaccine adoption.
RESULTS: The decision-making process for adopting malaria interventions and new vaccines in general takes years, involving several processes: meetings and presentations of scientific data from different studies with consistent results, packaging and disseminating evidence and getting approval for use by the Ministry of Health and Social Welfare (MOHSW). It is influenced by contextual factors; Promoting factors include; epidemiological and intervention characteristics, country experiences of malaria treatment policy change, presentation and dissemination of evidence, coordination and harmonization of the process, use of international scientific evidence. Barriers factors includes; financial sustainability, competing health and other priorities, political will and bureaucratic procedures, costs related to the adoption and implementations of interventions, supply and distribution and professional compliance with anti-malarial drugs.
CONCLUSION: The framework facilitates the synthesis of information in a coherent way, enabling a clearer understanding of the policy process, thereby speeding up the policy decision-making process and shortening the time for a malaria vaccine to become available.

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UW EDITORIAL COMMENT: Stake-holders identified the following key concerns relating to the supply and distribution of vaccine: “distribution issues arising from the logistics of transporting interventions from the manufacturer to the users;….whether the interventions need special transport and storage, how they are stored, availability of vehicles to facilitate transportation, and user-friendly packaging of vaccines to facilitate delivery; … training of health care personnel involved in vaccination to understand the intervention.

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 ("2015/2/15"[PDAT] : "2016/03/14"[PDAT]))

* On March 29, 2016, this search of English language articles published between February 15, 2015 and March 14, 2016 and indexed by the US National Library of Medicine resulted in 208 unique manuscripts.