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VACCINE DELIVERY RESEARCH DIGEST

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

REPORT TO THE BILL & MELINDA GATES FOUNDATION

APRIL 15, 2017

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1. Prenatal vaccination education intervention improves both the mothers' knowledge and children's vaccination coverage: Evidence from randomized controlled trial from eastern China.

Hu Y, Chen Y, Wang Y, Song Q, Li Q.

Hum Vaccin Immunother. 2017 Feb 21:1-8
PMID: 28319453

ABSTRACT

OBJECTIVES: To verify the effectiveness of prenatal vaccination education intervention on improving mother's vaccination knowledge and child's vaccination status in Zhejiang province, eastern China.
METHODS: Pregnant women with ≥ 12 gestational weeks were recruited and randomly assigned into the intervention group and the control group. The intervention group were given a vaccination education session while the control group were not. Two round surveys were performed before and 3 months after the intervention. The vaccination status of child was extracted at 12 months of age from immunization information system. The differences of the vaccination knowledge, the coverage, the completeness and the timeliness of vaccination between 2 groups were evaluated. The effectiveness of vaccination education intervention was assessed, under the control of the other demographic variables.
RESULTS: Among the 1252 participants, 851 subjects replied to the post-survey. Significant improvements of vaccination knowledge between the pre- and the post- survey in the intervention group were observed (Mean ± S.D:1.8 ± 1.1 vs. 3.7 ± 1.2 for vaccines score and 2.7 ± 1.5 vs. 4.8 ± 1.0 for vaccine policy score, respectively). The coverage of full vaccination was significantly higher in the intervention group (90.0% vs. 82.9%, P<0.01). The timeliness of full vaccination was significantly higher in the intervention group (51.9% vs. 33.0%, P<0.01). In the intervention group, pregnant women were more likely to be with high score of knowledge (OR = 5.2, 95%CI: 2.6-8.8), and children were more likely to complete the full series of vaccination (OR = 3.4, 95%CI: 2.1-4.8), and children were more likely to complete the full series of vaccination in a timely manner (OR = 2.3, 95%CI: 1.6-3.5).
CONCLUSIONS: Vaccination education in the pregnant women can effectively improve the knowledge regarding immunization and increase the coverage, the completeness and the timeliness of childhood vaccination. Strong partnership needs to be established between the obstetricians and the vaccination staff to improve the performance of NIP.

Web: https://dx.doi.org/10.1080/21645515.2017.1285476
Impact Factor: 2.37
Cited half-life: 1.80

UW Editorial Comment: This work contributes to a growing body of evidence demonstrating the potential effectiveness of maternal vaccine education offered in conjunction with prenatal care services to improve vaccine coverage and is the first RCT of its kind in China. The primary outcome was the difference in vaccine coverage at scheduled periods between the intervention and control arms. Secondary outcomes were the timeliness of vaccination and changes in maternal knowledge regarding vaccines.

There is a high degree of missing data, which could affect validity of the results. Baseline data on demographics, knowledge, and resources of vaccine information were collected for all participants, however investigators were only able to collect follow up data from only 68%. Authors asserted that the study remained adequately powered despite the high level of attrition, however participants exiting early are likely to be systematically different from those that continued to study end. The proportion of missing response data between intervention and control arms was not statistically significant. Another limitation of the study was the inability of investigators to account for external sources of information that may have impacted maternal knowledge between administration of pre and post surveys. Follow up for children occurred at 12 months but the vaccination coverage measure did not consider the age in which children received the vaccine. A longer follow up period may have enabled investigators to explore trends in vaccine coverage as it relates to timeliness.

2. Maternal education, empowerment, economic status and child polio vaccination uptake in Pakistan: a population based cross sectional study.

Khan MT, Zaheer S, Shafique K.

BMJ Open. 2017 Mar 10;7(3):e013853
PMID: 28283489

ABSTRACT

OBJECTIVES: To explore the association of maternal education and empowerment with childhood polio vaccination using nationally representative data of Pakistani mothers in a reproductive age group.
DESIGN: Cross-sectional.
SETTING: Secondary analysis of Pakistan Demographic and Health Survey (PDHS), 2012-2013 data was performed.
PARTICIPANTS: Of the 13 558 mothers included in the survey sample, 6982 mothers were able to provide information regarding polio vaccinations.
MAIN OUTCOME MEASURES: Polio vaccination coverage among children aged up to 5 years was categorised as complete vaccination (all four oral polio vaccine (OPV) doses), incomplete vaccination, and no vaccination (zero OPV dose received). Mothers' empowerment status was assessed using standard 'Measure DHS' questions regarding their involvement in decision-making related to health, household possessions and visits among family and friends. Education was categorised as no education, primary, secondary and higher education. Results of multinomial regression analyses were reported as adjusted OR with 95% CI. We adjusted for age, wealth index, urban/rural residence, place of delivery, and antenatal and postnatal visits.
RESULTS: Only 56.4% (n=3936) of the children received complete polio vaccination. Women with no education had significantly higher odds of their child receiving no polio vaccination (OR 2.34, 95% CI 1.05 to 5.18; p<0.01) and incomplete vaccination (OR 1.40, 95% CI 1.04 to 1.87; p<0.01). Further, unempowered women also had significantly higher odds of not taking their child for any polio vaccination (OR 1.58, 95% CI 1.17 to 2.12; p<0.01) and incomplete vaccination (OR 1.18, 95% CI 1.00 to 1.41; p=0.04).
CONCLUSIONS: Illiteracy, socioeconomic status and empowerment of women remained significant factors linked to poorer uptake of routine polio vaccination.

Web: https://dx.doi.org/10.1136/bmjopen-2016-013853
Impact Factor: 3.47
Cited half-life: 9.40

UW Editorial Comment: Vaccination status was determined using vaccination card and maternal self-report if cards were unavailable. Maternal report is subject to recall bias and the two forms of data collection for the single outcome also present opportunities for misclassification of vaccine status. The investigators take particular interest in the effects of maternal unempowerment on polio vaccination uptake despite the mixed results seen in unvaccinated and partial vaccination outcomes. Investigators believe that empowered mothers may act as strategic partners in vaccine coverage in settings with low vaccine compliance. The authors note empowerment can take many definitions. In this study a mother was considered empowered if she reported being directly involved in any decisions regarding her healthcare, household purchases, or visits to her family or relatives. This rendering of empowerment assumes a mother's ability to make choices regarding the vaccination of her child is determined by and limited to any opposition she may face from her partner.

Figures 1 and 2 illustrate differences between urban and rural settings for non-vaccination with respect to wealth index rankings and maternal education. Authors suggest this may be due to internal migration of population from rural to urban settings and growing urbanization may counteract the positive effects of urban environments on vaccine uptake.

3. Spread of yellow fever virus outbreak in Angola and the Democratic Republic of the Congo 2015-16: a modeling study.

Kraemer MU, Faria NR, Reiner RC Jr, Golding N, Nikolay B, Stasse S, Johansson MA, Salje H, Faye O, Wint GR, Niedrig M, Shearer FM, Hill SC, Thompson RN, Bisanzio D, Taveira N, Nax HH, Pradelski BS, Nsoesie EO, Murphy NR, Bogoch II, Khan K, et al.

The Lancet Infectious Diseases. 2017 Mar 31;17(3):330-8.
PMID: 28017559

ABSTRACT

BACKGROUND: Since late 2015, an epidemic of yellow fever has caused more than 7334 suspected cases in Angola and the Democratic Republic of the Congo, including 393 deaths. We sought to understand the spatial spread of this outbreak to optimise the use of the limited available vaccine stock.

METHODS: We jointly analysed datasets describing the epidemic of yellow fever, vector suitability, human demography, and mobility in central Africa to understand and predict the spread of yellow fever virus. We used a standard logistic model to infer the district-specific yellow fever virus infection risk during the course of the epidemic in the region.

FINDINGS: The early spread of yellow fever virus was characterised by fast exponential growth (doubling time of 5–7 days) and fast spatial expansion (49 districts reported cases after only 3 months) from Luanda, the capital of Angola. Early invasion was positively correlated with high population density (Pearson's *r* 0·52, 95% CI 0·34–0·66). The further away locations were from Luanda, the later the date of invasion (Pearson's *r* 0·60, 95% CI 0·52–0·66). In a Cox model, we noted that districts with higher population densities also had higher risks of sustained transmission (the hazard ratio for cases ceasing was 0·74, 95% CI 0·13–0·92 per log-unit increase in the population size of a district). A model that captured human mobility and vector suitability successfully discriminated districts with high risk of invasion from others with a lower risk (area under the curve 0·94, 95% CI 0·92–0·97). If at the start of the epidemic, sufficient vaccines had been available to target 50 out of 313 districts in the area, our model would have correctly identified 27 (84%) of the 32 districts that were eventually affected.

INTERPRETATION: Our findings show the contributions of ecological and demographic factors to the ongoing spread of the yellow fever outbreak and provide estimates of the areas that could be prioritised for vaccination, although other constraints such as vaccine supply and delivery need to be accounted for before such insights can be translated into policy.

Web: https://dx.doi.org/ 10.1016/S1473-3099(16)30513-8
Impact Factor: 5.82
Cited half-life: 4.70

UW Editorial Comment: Data were sourced from Angola and DRC yellow fever (YF) outbreaks and WHO situation reports. Authors identified key ecological and demographic determinants of YF transmission and developed an analytical framework to prioritize districts (Angola) and communes (DRC) for interventions. The model performed well in estimating the geographic spread of YF using existing data, and indicated spatial expansion of the YF virus was predicted by human mobility captured using de-identified mobile phone data. Authors suggest increased reporting during initial stages of the outbreak are typical and may inflate the reproduction number (R_0) and estimates for critical vaccination coverage. There was a strong neighborhood effect at the subnational unit levels, hence using national data to estimate reproduction number may limit accuracy, and estimates of transmission dynamics may be more accurate at smaller units of geography. The ratio of mosquitos to humans in is not well established at district and commune levels, so the model was unable to characterize heterogeneity in vector spatial distribution, and suitability (the effect of environmental factors in limiting vector persistence and transmissibility) remained approximately constant throughout the regions. The absence of vaccination and count data at the subnational unit prohibits estimating impact of vaccination campaign on outbreak duration and spread.

4. Rationale and support for a One Health program for canine vaccination as the most cost-effective means of controlling zoonotic rabies in endemic settings.

Lavan RP, King AI, Sutton DJ, Tunceli K.

Vaccine. 2017 Mar 23;35(13):1668-1674.
PMID: 28216188

ABSTRACT

Although dog vaccination has been demonstrated to reduce and eliminate rabies in humans, during meetings there are often calls for further pilot studies. The assembled data proves that a widespread approach is now required. While zoonotic rabies has a minimal presence in developed nations, it is endemic throughout most of Asia and Africa, where it is considered to be a neglected tropical disease. In these areas, rabies causes an estimated annual mortality of at least 55,000 human deaths. Worldwide rabid dogs are the source of the vast majority of human rabies exposures. The World Health Organization (WHO), the Food and Agriculture Organization (FAO) of the United Nations and the World Organization for Animal Health (OIE) advocate a collaborative One Health approach involving human public health and veterinary agencies, with mass canine vaccination programs in endemic areas being the mainstay of strategies to eliminate dog-mediated human rabies. While post-exposure prophylaxis (PEP) is effective in preventing deaths in people exposed to rabies, it is comparatively expensive and has little impact on the canine reservoir that is the primary source of zoonotic rabies. Indiscriminate culling of the dog population is expensive and there is little evidence that it is effective in controlling rabies in non-island locations. Mass canine vaccination programs using a One Health framework that achieves a minimum 70% vaccination coverage during annual campaigns have proven to be cost-effective in controlling zoonotic rabies in endemic, resource-poor regions. Case studies, such as in Tanzania and Bhutan, illustrate how an approach based on mass canine rabies vaccination has effectively reduced both canine and human rabies to minimal levels. The multiple benefits of mass canine rabies vaccination in these cases included eliminating rabies in the domestic dog reservoirs, eliminating human rabies cases, and decreasing the rabies economic burden by reducing expenditures on PEP.

Web: https://dx.doi.org/ 10.1016/j.vaccine.2017.02.014
Impact Factor: 3.62
Cited half-life: 5.50

UW Editorial Comment: Passive reporting systems and sporadic surveillance in Africa and Asia are likely to underestimate the true incidence of human rabies deaths. Human rabies vaccines have ~100% efficacy for both prevention and post-exposure prophylaxis (PEP), but are too costly for widespread use in most LMIC. Canines represent the largest source for rabies transmission to humans in Asia and Africa, and the commentary asserts that canine vaccination is the most cost effective control measure in endemic settings. The relatively low transmissibility of Rabies (R_0: 1.05–1.72) suggests successful control of canine rabies may be achieved with vaccine coverage rates below the minimum 70% threshold.

A case study in Bhutan found a mass canine vaccination and sterilization program over the course of 6 years became cost effective in 3 years and resulted in an ultimate savings of $40,000. The cost per dog of was estimated to be $1.20 for vaccination and $6.36 for sterilization, but assert sterilization is not an essential component of canine rabies control. The authors do not provide estimates of the change in incidence of human rabies cases achieved before and after the intervention. The price per dose of canine rabies vaccines in government and NGO led campaigns is unknown but estimates for vaccines in the developing world range between $0.20-$1.00/dose, with the majority of campaign costs covering personnel and logistics. The authors also discuss the potential value added in developing a thermostable canine rabies vaccine. The article does not discuss the cost effectiveness of alternative intervention strategies or combined interventions.

5. Measles epidemic in Brazil in the post-elimination period: Coordinated response and containment strategies.

Lemos DR, Franco AR, de Sá Roriz ML, Carneiro AK, de Oliveira Garcia MH, de Souza FL, Duron Andino R, de Góes Cavalcanti LP

Vaccine. 2017 Mar 23;35(13):1721-1728.
PMID: 28256359

ABSTRACT

The measles virus circulation was halted in Brazil in 2001 and the country has a routine vaccination coverage against measles, mumps and rubella higher than 95%. In Ceará, the last confirmed case was in 1999. This article describes the strategies adopted and the effectiveness of surveillance and control measures implemented during a measles epidemic in the post-elimination period. The epidemic started in December 2013 and lasted 20 months, reaching 38 cities and 1,052 confirmed cases. The D8 genotype was identified. More than 50,000 samples were tested for measles and 86.4% of the confirmed cases had a laboratory diagnosis. The beginning of an campaign vaccination was delayed in part by the availability of vaccine. The classic control measures were not enough to control the epidemic. The creation of a committee of experts, the agreement signed between managers of the three spheres of government, the conducting of an institutional active search of suspected cases, vaccination door to door at alternative times, the use of micro planning, a broad advertising campaign at local media and technical operative support contributed to containing the epidemic. It is important to recognize the possibility of epidemics at this stage of post-elimination and prepare a sensitive surveillance system for timely response.

Web: https://dx.doi.org/ 10.1016/j.vaccine.2017.02.023
Impact Factor: 3.62
Cited half-life: 5.50

UW Editorial Comment: Authors suspect the measles virus is likely to circulate faster than conventional outbreak vaccination programs can respond, and limiting control efforts to vaccinating direct contacts of measles cases, rather than more broadly vaccinating all susceptible individuals, was a critical misstep at the onset of the epidemic. The slow and fragmented outbreak response may have extended the duration and geographic spread of the epidemic. The high infective potential of the virus may provide some account as to how the measles epidemic in Ceará took place despite the high rate of routine vaccination coverage for the measles virus in the area. Pockets of susceptible populations in Ceará demonstrate the need for rapid monitoring of routine vaccine coverage and the continued collection and analysis of data especially as it pertains to high-risk groups.

Following the implementation of immunization efforts, scanning vaccination helped to identify and treat susceptible individuals and active cases for all individuals age 6 months-49 years. Authors highlighted scanning vaccination methods are integral to the success and sustainability of measles and rubella eradication programs in the Americas.

6. Rotavirus immunization: Global coverage and local barriers for implementation.

Lo Vecchio A, Liguoro I, Dias JA, Berkley JA, Boey C, Cohen MB, Cruchet S, Salazar-Lindo E, Podder S, Sandhu B, Sherman PM, Shimizu T,

Vaccine. 2017 Mar 14;35(12):1637-1644.
PMID: 28216189

ABSTRACT

BACKGROUND: Rotavirus (RV) is a major agent of gastroenteritis and an important cause of child death worldwide. Immunization (RVI) has been available since 2006, and the Federation of International Societies of Gastroenterology Hepatology and Nutrition (FISPGHAN) identified RVI as a top priority for the control of diarrheal illness. A FISPGHAN working group on acute diarrhea aimed at estimating the current RVI coverage worldwide and identifying barriers to implementation at local level.

METHODS: A survey was distributed to national experts in infectious diseases and health-care authorities (March 2015-April 2016), collecting information on local recommendations, costs and perception of barriers for implementation.

RESULTS: Forty-nine of the 79 contacted countries (62% response rate) provided a complete analyzable data. RVI was recommended in 27/49 countries (55%). Although five countries have recommended RVI since 2006, a large number (16, 33%) included RVI in a National Immunization Schedule between 2012 and 2014. The costs of vaccination are covered by the government (39%), by the GAVI Alliance (10%) or public and private insurance (8%) in some countries. However, in most cases, immunization is paid by families (43%). Elevated cost of vaccine (49%) is the main barrier for implementation of RVI. High costs of vaccination (rs=-0.39, p=0.02) and coverage of expenses by families (rs=0.5, p=0.002) significantly correlate with a lower immunization rate. Limited perception of RV illness severity by the families (47%), public-health authorities (37%) or physicians (24%) and the timing of administration (16%) are further major barriers to large- scale RVI programs.

CONCLUSIONS: After 10 years since its introduction, the implementation of RVI is still unacceptably low and should remain a major target for global public health. Barriers to implementation vary according to setting. Nevertheless, public health authorities should promote education for caregivers and health-care providers and interact with local health authorities in order to implement RVI.

Web: https://dx.doi.org/ 10.1016/j.vaccine.2017.01.082
Impact Factor: 3.62
Cited half-life: 5.50

UW Editorial Comment: Seventy-two countries comprise 95% of all rotavirus-related mortality. In 2016, 80 countries included RVI in their National Immunization Program. Barriers to RVI dissemination varied both between and within nations. Cost and perceptions of the burden of rotavirus were the most frequently reported barriers to implementing universal immunization. Although rare, safety concerns centered around the risk of intussusception as a side effect. Surveys were administered to participants drawn from a convenience sample of members of the FISPGHAN working group, limiting generalizability. Forty percent of survey responses came from European countries where rotavirus related mortality is rare. Responses from high-income European countries may reflect less interest in RVI, which would bias the sample towards a lower perceived severity of rotavirus.

7. Analysis of the effects of individual and community level factors on childhood immunization in Malawi.
Ntenda PA, Chuang KY, Tiruneh FN, Chuang YC.
Vaccine. 2017 Apr 4;35(15):1907-1917.
PMID: 28284678

ABSTRACT

BACKGROUND: Empirical evidence regarding the relationship between childhood immunization and individual- and community-level factors in low-income countries has received little attention. We compared the trends and the effects of a wide range of individual- and community-level socioeconomic factors on the likelihood of a child being immunized between 2004 and 2010 in Malawi.
METHODS: We used data from the 2004 and 2010 Malawi Demographic and Health Survey and applied generalized estimating logistic regression equation to analyze data respectively on 2042 and 3496 children aged 12-23months. We compared the relationship between individual- and community-level socioeconomic factors and a child's vaccination status for four basic vaccines recommended by the World Health Organization: bacillus Calmette-Guérin (BCG) vaccine, diphtheria-tetanus-pertussis (DPT3) vaccine, oral polio vaccine (OPV3), and measles-containing vaccine 1 (MCV1).
RESULTS: The trends of vaccination had a similar pattern in 2004 and 2010. The coverage of the four vaccinations was highest for BCG and lowest for OPV3 and complete immunization was higher in 2010. The multivariate analyses show that mother's low education, having one or none antenatal visits, having no immunization card, having immunization card but not seen, residing in poor households, and living in central region were the most significant factors associated with decreased odds of achieving vaccination coverage and complete vaccination in both 2004 and 2010. However, maternal education was more likely to be associated with children's immunization in 2010, while the geographical region was more likely to be associated with children's immunization in 2004.
CONCLUSIONS: There were marked improvements in the national immunization coverage from 2004 to 2010. In order to achieve complete immunization, to further enhance the national immunization coverage as well as to lessen the gaps and disparities in childhood vaccination in Malawi, policy makers should design interventions based on the factors addressed in this study.

Web: https://dx.doi.org/ 10.1016/j.vaccine.2017.02.036
Impact Factor: 3.62
Cited half-life: 5.50

UW Editorial Comment: The authors report this is the first study examining the relative impacts of community and individual level drivers of vaccine uptake in Malawi. Strengths of the study include the multilevel analysis, use of the nationally representative DHS data, and restriction of the analysis to the relevant demographic. Malawi's EPI recommends children receive the complete vaccination schedule by 12 months. Investigators examined outcomes of children ages 12-23 months to capture vaccines administered within the first 12 months and catch-up vaccines administered after 12 months.

Study limitations include potential recall bias because vaccine uptake was assessed by maternal report. Investigators compare the effects of 11 individual and seven community level categorical variables with respect to five different outcomes; because the large numbers of statistical tests do not account for multiple comparisons significant p values should be interpreted with caution. Figure 1 is a line graph presenting changes in five vaccination outcomes for a single time interval; the use of line graphs and presentation of categorical variables on the x-axis makes the graph subject to misinterpretation and gives the impression of illustrating longitudinal data.

8. Hepatitis B vaccination timing: results from demographic health surveys in 47 countries.
Schweitzer A, Akmatov MK, Krause G.
Bull World Health Organ. 2017 Mar 1;95(3):199-209G.
PMID: 28250533

ABSTRACT

OBJECTIVE: To examine the impact of hepatitis B vaccination schedules and types of vaccines on hepatitis B vaccination timing.
METHODS: We used data for 211 643 children from demographic and health surveys in 47 low- and middle-income countries (median study year 2012). Data were from vaccination cards and maternal interviews. We grouped countries according to the vaccination schedule and type of vaccine used (monovalent or combination). For each country, we calculated hepatitis B vaccination coverage and timely receipt of vaccine doses. We used multivariable logistic regression models to study the effect of vaccination schedules and types on vaccination delay.
FINDINGS: Substantial delays in vaccination were observed even in countries with fairly high coverage of all doses. Median delay was 1.0 week (interquartile range, IQR: 0.3 to 3.6) for the first dose (*n* = 108 626 children) and 3.7 weeks (IQR: 1.4 to 9.3) for the third dose (*n* = 101 542). We observed a tendency of lower odds of delays in vaccination schedules starting at 6 and at 9 weeks of age. For the first vaccine dose, we recorded lower odds of delays for combination vaccines than for monovalent vaccines (adjusted odds ratio, aOR: 0.76, 95% confidence interval, CI: 0.71 to 0.81).
CONCLUSION: Wide variations in hepatitis B vaccination coverage and adherence to vaccination schedules across countries underscore the continued need to strengthen national immunization systems. Timely initiation of the vaccination process might lead to timely receipt of successive doses and improved overall coverage. We suggest incorporating vaccination timing as a performance indicator of vaccination programmes to complement coverage metrics.

Web: https://dx.doi.org/ 10.2471/BLT.16.178822
Impact Factor: 5.30
Cited half-life: >10

UW Editorial Comment: The authors define vaccine coverage as the receipt of the full course of HBV vaccine. Vaccination cards were only available for 58% of the children included in the study. Figure 1 illustrates the pooled distribution of ages in which children were indicated to have received their first and third doses using data extracted from vaccination cards. Varied immunization schedules across countries may explain some of the variation in age at dose. Vaccine coverage rates demonstrated considerable variation across countries even when countries utilized the same vaccines and shared identical vaccine schedules. In comparing coverage rates for the first and third doses investigators noted a decline in coverage and timely delivery independent of vaccine schedule and type. However, vaccine coverage and timing were only weakly correlated in the data (Spearman rho = 0.28; P = 0.05), which may suggest lengthy periods of incomplete protection. Only 13 countries in the study report compliance with WHO recommendation of administering vaccine at birth. Investigators assert that administering birth doses in Africa to suppress perinatal and early horizontal infections warrants additional consideration given the potentially high risk of transmission from HBeAg-positive mothers.

Investigators note barriers to immunization stemming from the range of inequities in healthcare delivery and access across the 47 LMIC represented in the study are likely to account for the considerable variation observed between countries. The use of DHS data prohibits comparisons across counties as surveys are conducted at in different years (median year = 2012).

9. Is Colombia reaching the goals on infant immunization coverage? A quantitative survey from 80 municipalities.

Narváez J, Osorio MB, Castañeda-Orjuela C, Zakzuk NA, Cediel N, Chocontá-Piraquive LÁ, de La Hoz-Restrepo F.
Vaccine. 2017 Mar 13;35(11):1501-8.
PMID: 28209436

ABSTRACT

OBJECTIVES: This study aimed to evaluate the coverage of the Colombian Expanded Program on Immunization among children less than 6years old, to evaluate the timeliness of immunization, to assess the coverage of newly introduced vaccines, and to identify factors associated with lack of immunization.

METHODS: We conducted a cross-sectional survey in 80 municipalities of Colombia, using a two-stage cluster random sampling. We attempted to contact all children less than 6years old living in the sampled blocks, and asked their caregivers to provide immunization record cards. We also collected basic sociodemographic information.

RESULTS: We reached 81% of the attempted household contacts, identifying 18,232 children; of them, 14,805 (83%) had an immunization record card. Coverage for traditional vaccines was above 90%: BCG (tuberculosis) 95.7% (95%CI: 95.1-96.4), pentavalent vaccine 93.3% (92.4-94.3), MMR (measles, mumps, rubella) initial dose 94.5% (93.5-95.6); but it was lower for recently introduced vaccines: rotavirus 80% (77.8-82.1), influenza 48.4% (45.9-50.8). Results for timely vaccination were not equally successful: pentavalent vaccine 44.2% (41.4-47.1), MMR initial dose 71.2% (68.9-73.4). Mother's education was significantly associated with higher immunization odds. Older age, a greater number of siblings, low socioeconomic status, and not having health insurance were significantly associated with lower immunization odds. There was significant heterogeneity in immunization rates by municipality across the country.

CONCLUSIONS: Although absolute immunization coverage for traditional vaccines met the goal of 90% for the 80 municipalities combined, disparities in coverage across municipalities, delayed immunization, and decline of coverage with age, are common problems in Colombia that may result in reduced protection. Newly introduced vaccines require additional efforts to reach the goal. These results highlight the association of health inequities with low immunization coverage and delayed immunization. Identification of vulnerable populations and their missed opportunities for vaccination may help to improve the reach of immunization programs.

Web: https://dx.doi.org/ 10.1016/j.vaccine.2017.01.073
Impact Factor: 3.62
Cited half-life: 5.50

START Editorial Comment: The primary limitation of the study is the degree of missing outcome data used to calculate absolute and timely coverage. Absolute coverage is define as the proportion of children having received full series of vaccines recommended for their age regardless of whether or not those vaccines were administered according to the EPI schedule. Timely coverage is defined as the proportion of children receiving every single dose at the recommended ages and is a more stringent indicator of vaccine compliance than absolute coverage. Investigators assert medical records maintained by robust health information systems are more likely to document comprehensive vaccination history than immunization record cards. Immunization cards tend to underestimate the true number of vaccines received by children. Investigators relying on immunization cards as the primary source of outcome data would be at risk of underreporting absolute coverage. However, the authors assert the absolute coverage was above 90% for many of the vaccines evaluated in this study so it is unlikely that the degree of missing outcomes data are large enough to bias OR estimates to a large degree. Similarly, the proportion of timely coverage may be greater than or equal to OR estimates provided in table 5.

10. Utilization of outreach immunization services among children in Hoima District, Uganda: a cluster survey.

Oryema P, Babirye JN, Baguma C, Wasswa P, Guwatudde D.

BMC Res Notes. 2017 Feb 27;10(1):111.
PMID: 28241865

ABSTRACT

BACKGROUND: The global vaccine action plan 2011–2020 was endorsed by 194 states to equitably extend the benefits of immunization to all people. However, gaps in vaccination coverage remain in developing countries such as Uganda. One of the strategies used to tackle existing inequities is implementation of outreach immunization services to deliver services to those with poor geographical access. However, reports of inconsistent use of these services prevail; therefore understanding the factors associated with use of these services is critical for improving service delivery. This study examined the factors associated with utilization of outreach immunization services among children aged 10–23 months in Hoima District, Uganda.

RESULTS: Overall, 87.4% (416/476) of the children had ever utilized outreach immunization services. Of these, 3.6% (15/416) had completed their entire immunization schedules from outreach immunization sessions. Use of outreach services was associated with reports that the time of outreach sessions was convenient [adjusted odds ratio (AOR) 2.9, 95% confidence interval (CI) 1.32–6.51], community mobilization was done prior to outreach sessions (AOR 4.9, 95% CI 1.94–12.61), the caretaker knew the benefits of childhood immunizations (AOR 2.1, 95% CI 1.30–4.42), and the caretaker was able to name at least four vaccine preventable diseases (AOR 3.0, 95% CI 1.13–7.88).

CONCLUSIONS: Utilization of outreach immunization services in Hoima District was high but reduced with subsequent vaccine doses. Therefore, strategies targeted at retaining service users for the entire immunization schedule need to be developed and implemented. Such strategies could include health education emphasizing the benefits of childhood immunization.

Web: https://dx.doi.org/ 10.1186/s13104-017-2431-1
Impact Factor: 1.6
Cited half-life: 0

START Editorial Comment: Investigators implemented a three-stage cluster sampling technique. In the first stage investigators selected 6 sub county districts using simple random sampling, in the 2nd stage 68 village clusters were selected without replacement using computer generated random numbers. In the final stage, investigators identified a random junction in the village and then moved towards the center of the village, as they proceeded to identify households with eligible participants. Investigators used probability proportionate to size method to determine the number of respondents required per cluster. Selected for inclusion in the study if they had lived in the study area for at least 10 months. Investigators chose the youngest child in households with more than one child and in households with multiple births a single child was elected using a table of random numbers.

Investigators dichotomized and define utilization such that high users sought outreach immunization services for ≥3 of the 5 recommend immunization schedules, and low users sought services for < 3 of the 5 recommend immunization schedules. Data were collected on social demographic variables for child and caretakers and factors such as convenience of time of outreach sessions, community mobilization, caretakers' marital status, educational attainment, knowledge of immunization, religion and occupation, the frequency of outreach sessions, and health workers' behaviors. Questionnaires were translated from English to Runyoro, the most commonly spoken local language. Responses were then back translated to English to check for consistency and interpretability. Investigators suspect noncompliant respondents may have felt social pressure to over-report vaccine uptake this may result in spuriously inflated risk estimates. The cross sectional study design also prohibits data collection of outreach services utilized before and after the survey period.

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]) ("2017/2/15"[PDAT] : "2017/3/14"[PDAT]))

* On April 5, 2017, this search of English language articles published between February 15th, 2017 and March 14th, 2017 and indexed by the US National Library of Medicine resulted in 206 unique manuscripts.