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Details of Articles

1. Geographical variation and associated factors of childhood measles vaccination in Ethiopia: a spatial and multilevel analysis

Geremew TT, Gezie LD, Abejie AN.

BMC Public Health. 2019 Aug 30;19(1):1194.

PubMed ID: 31470822

ABSTRACT

BACKGROUND:

In Ethiopia, despite considerable improvement of measles vaccination, measles outbreaks are occurring in most parts of the country. Understanding the neighborhood variation in childhood measles vaccination is crucial for evidence-based decision-making. However, the spatial pattern of measles-containing vaccine (MCV1) and its predictors are poorly understood. Hence, this study aimed to explore the spatial pattern and associated factors of childhood MCV1 coverage.

METHODS:

An in-depth analysis of the 2016 Ethiopia demographic and health survey data was conducted, and a total of 3722 children nested in 611 enumeration areas were included in the analysis. Global Moran's I statistic and Poisson-based purely spatial scan statistics were employed to explore spatial patterns and detect spatial clusters of childhood MCV1, respectively. Multilevel logistic regression models were fitted to identify factors associated with childhood MCV1.

RESULTS:

Spatial heterogeneity of childhood MCV1 was observed (Global Moran's I = 0.13, p-value < 0.0001), and seven significant SaTScan clusters of areas with low MCV1 coverage were detected. The most likely primary SaTScan cluster was detected in the Afar Region, secondary cluster in Somali Region, and tertiary cluster in Gambella Region. In the final model of the multilevel analysis, individual and community level factors accounted for 82% of the variance in the odds of MCV1 vaccination. Child age (AOR = 1.53; 95%CI: 1.25-1.88), pentavalent vaccination first dose (AOR = 9.09; 95%CI: 6.86-12.03) and third dose (AOR = 7.12; 95%CI: 5.51-9.18), secondary and above maternal education (AOR = 1.62; 95%CI: 1.03-2.55) and media exposure were the factors that increased the odds of MCV1 vaccination at the individual level. Children with older maternal age had lower odds of receiving MCV1. Living in Afar, Oromia, Somali, Gambella and Harari regions were factors associated with lower odds of MCV1 from the community-level factors. Children far from health facilities had higher odds of receiving MCV1 (AOR = 1.31, 95%CI = 1.12-1.61).

CONCLUSION:

A clustered pattern of areas with low childhood MCV1 coverage was observed in Ethiopia. Both individual and community level factors were significant predictors of childhood MCV1. Hence, it is good to give priority for the areas with low childhood MCV1 coverage, and to consider the identified factors for vaccination interventions.

WEB: [10.1186/s12889-019-7529-z](https://doi.org/10.1186/s12889-019-7529-z)

IMPACT FACTOR: 2.567

CITED HALF-LIFE: 3.90

START COMMENTARY

Using the 2016 Ethiopia Demographic and health survey (EDHS), Geremew et al. conducted a multilevel analysis of individual and community level factors associated with receipt of the first dose of measles-containing vaccine (MCV1), as well as a spatial analysis of clustering of low MCV1 coverage. Low MCV1 clusters identified were described in Table 3 and Figure 2, showing the primary cluster in the Afar region. The Afar region was also found to have lower odds of MCV1 coverage (AOR: 0.32, 95% CI: 0.13–0.81) when compared to Addis Ababa in the adjusted model (Table 4, Model IV). Authors noted a few reasons that could explain the clustering, informed by the multilevel analysis, including the barrier of distance to health facilities. Authors use data from a nationally representative survey, a strength of the study. Furthermore, the assessment of the spatial distribution of MCV1 coverage allows for the identification of potential areas susceptible for measles outbreaks. Data obtained from demographic and health surveys are subject to recall bias, e.g., maternal recall of childhood vaccination. Additionally, measurement error of spatial data (e.g., location) is another potential limitation of the study.

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2. Age-appropriate vaccination coverage and its associated factors for pentavalent 1-3 and measles vaccine doses, in northeast Ethiopia: A community-based cross-sectional study

Marefiaw TA, Yenesew MA, Mihirete KM.

PLoS One. 2019 Aug 16;14(8):e0218470.

PubMed ID: 31419230

ABSTRACT

BACKGROUND:

In Ethiopia, there are limited studies on age-appropriate vaccinations that children received at the recommended specific ages. Therefore, we assessed age-appropriate vaccinations coverage and its associated factors among children 12 to 23 months of age in Menz Lalo district, northeast Ethiopia.

METHODS:

A community-based cross-sectional study was conducted in Menz Lalo district from March to April/2018 among 417 mothers/caregivers with children 12 to 23 months of age using simple random sampling technique. Data were collected using a pretested structured questionnaire. Information about children's vaccination status was collected from vaccination cards. Age-appropriate vaccination coverage was measured using World Health Organization vaccination schedule recommendation. Data was entered into Epi-Info7 software and exported to SPSS-20 for analysis. Four consecutive logistic regression models were performed to identify factors associated with age-inappropriate vaccinations. A P-value of ≤ 0.05 was considered to state statistically significant associations.

RESULTS:

Age-appropriate vaccination coverage was 39.1% (95% CI: 34.3 to 44) for pentavalent 1, 36.3% (95% CI: 31.6 to 41.5) for pentavalent 2, 30.3% (95% CI: 25.6 to 35) for pentavalent 3 and 26.4% (95% CI: 21.7 to 31) for measles vaccine doses. Age-inappropriate pentavalent 1-3 vaccinations was associated with being male sex (AOR: 0.47, 95% CI: 0.29-0.74), lack of telephone (AOR: 2.2, 95% CI: 1.4-3.6), lack of usual caretaker (AOR: 2.6, 95% CI: 1.3-5.2), unplanned pregnancy (AOR: 1.9, 95% CI: 1.1-3.5), missing pregnant women's conference (AOR: 2.7, 95% CI: 1.3-5.7), decreasing birth order (AOR: 0.34, 95% CI: 0.17-0.68) and insufficient knowledge (AOR: 2.7, 95% CI: 1.6-4.4).

CONCLUSION:

The proportions of age-appropriate vaccination coverage were low in the study area. Modifiable factors were associated with age-inappropriate vaccinations. Vaccination interventions should consider identified modifiable factors to improve age-appropriate vaccinations coverage.

WEB: [10.1371/journal.pone.0218470](https://doi.org/10.1371/journal.pone.0218470)

IMPACT FACTOR: 2.776

CITED HALF-LIFE: 2.70

START COMMENTARY

In a district of about 41,000 persons in Ethiopia, Marefiaw et al. administered a community-based, cross-sectional survey to assess the coverage of age-appropriate (or timely) vaccination among children aged 12 to 23 months. Age-appropriate vaccination was defined as vaccination “within one month after the minimum age to administer the dose as recommended by WHO.” Age-inappropriate vaccination was defined as vaccination “earlier and/or delayed than the recommended age” (see page 5 for more operational definitions). The exclusion of mothers who did not have vaccination cards with vaccination dates for their child or who were too ill to respond to the survey may introduce selection bias as that population may be more likely to have children with delayed or incomplete vaccination; however, it is unclear how many children were excluded for this reason. Another limitation of the study is the potential for recall bias and social desirability bias in survey responses. This study has several strengths. Authors conducted survey validations to ensure reliability of questions. Trainings and data checks were also conducted to ensure data quality. In addition to providing further insight into vaccine coverage through timeliness (versus up-to-date coverage), authors also observed that factors associated with age-appropriate vaccination differed by dose and highlighted the importance of tailoring intervention strategies to respond to age-inappropriate vaccination at each dose.

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[3. Measles seroprevalence after reactive vaccination campaigns during the 2015 measles outbreak in four health zones of the former Katanga Province, Democratic Republic of Congo](#)

Keating P, Carrion Martin AI, Blake A, Lechevalier P, Uzzeni F, Gignoux E, et al.

BMC Public Health. 2019 Aug 22;19(1):1153.

PubMed ID: 31438898

ABSTRACT

BACKGROUND:

Measles continues to circulate in the Democratic Republic of Congo, and the country suffered from several important outbreaks over the last 5 years. Despite a large outbreak starting in the former province of Katanga in 2010 and the resulting immunization activities, another outbreak occurred in 2015 in this same region. We conducted measles seroprevalence surveys in four health zones (HZ) in the former Katanga Province in order to assess the immunity against measles in children 6 months to 14 years after the 2015 outbreak.

METHODS:

We conducted multi-stage cluster surveys stratified by age group in four HZs, Kayamba, Malemba-Nkulu, Fungurume, and Manono. The age groups were 6-11 months, 12-59 months, and 5-14 years in Kayamba and Malemba-Nkulu, 6-59 months and 5-14 years in Manono and Fungurume. The serological status was measured on dried capillary blood spots collected systematically along with vaccination status (including routine Extended Program of Immunization (EPI), and supplementary immunization activities (SIAs)) and previous self-reported history of suspected measles.

RESULTS:

Overall seroprevalence against measles was 82.7% in Kayamba, 97.6% in Malemba-Nkulu, 83.2% in Manono, and 74.4% in Fungurume, and it increased with age in all HZs. It was 70.7 and 93.8% in children 12-59 months in Kayamba and Malemba-Nkulu, and 49.8 and 64.7% in children 6-59 months in Fungurume and Manono. The EPI coverage was low but varied across HZ. The accumulation of any type of vaccination against measles resulted in an overall vaccine coverage (VC) of at least 85% in children 12-59 months in Kayamba and Malemba-Nkulu, 86.1 and 74.8% in children 6-59 months in Fungurume and Manono. Previous measles infection in 2015-early 2016 was more frequently reported in children aged 12-59 months or 6-59 months (depending on the HZ).

CONCLUSION:

The measured seroprevalence was consistent with the events that occurred in these HZs over the past few years. Measles seroprevalence might prove a valuable source of information to help adjust the timing of future SIAs and prioritizing support to the EPI in this region as long as the VC does not reach a level high enough to efficiently prevent epidemic flare-ups.

WEB: [10.1186/s12889-019-7500-z](https://doi.org/10.1186/s12889-019-7500-z)

IMPACT FACTOR: 2.567

CITED HALF-LIFE: 3.90

START COMMENTARY

Keating et al. conducted a measles seroprevalence study in four health zones in the Democratic Republic of Congo (DRC). Authors reported that observed levels of protection were generally consistent with surveillance and vaccination coverage estimates. However, there are a number of limitations readers should consider. Enzyme linked immunosorbent assay (ELISA) using dried blood spots were used to determine seroprevalence instead of the reference technique, plaque reduction neutralization tests (PRNT), and serum. Furthermore, authors used a conservative cutoff of 500 mIU/mL to indicate protection as there is no clear correlate of clinical protection. (In sensitivity analyses other cutoff values did not substantially impact results.) Authors also noted delays in processing samples, which may result in an underestimation of seroprevalence. Additionally, this study is subject to recall bias as measles vaccination and natural infection were often self-reported. In areas where surveillance and vaccination coverage data are limited, seroprevalence surveys may inform measles control efforts.

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4. Optimization of frequency and targeting of measles supplemental immunization activities in Nigeria: A cost-effectiveness analysis

Zimmermann M, Frey K, Hagedorn B, Oteri AJ, Yahya A, Hamisu M, et al.

Vaccine. 2019 Sep 24;37(41):6039-6047. Epub 2019 Aug 27.

PubMed ID: 31471147

ABSTRACT

BACKGROUND:

Measles causes significant childhood morbidity in Nigeria. Routine immunization (RI) coverage is around 40% country-wide, with very high levels of spatial heterogeneity (3-86%), with supplemental immunization activities (SIAs) at 2-year or 3-year intervals. We investigated cost savings and burden reduction that could be achieved by adjusting the inter-campaign interval by region.

METHODS:

We modeled 81 scenarios; permuting SIA calendars of every one, two, or three years in each of four regions of Nigeria (North-west, North-central, North-east, and South). We used an agent-based disease transmission model to estimate the number of measles cases and ingredients-based cost models to estimate RI and SIA costs for each scenario over a 10 year period.

RESULTS:

Decreasing SIAs to every three years in the North-central and South (regions of above national-average RI coverage) while increasing to every year in either the North-east or North-west (regions of below national-average RI coverage) would avert measles cases (0.4 or 1.4 million, respectively), and save vaccination costs (save \$19.4 or \$5.4 million, respectively), compared to a base-case of national SIAs every two years. Decreasing SIA frequency to every three years in the South while increasing to every year in the just the North-west, or in all Northern regions would prevent more cases (2.1 or 5.0 million, respectively), but would increase vaccination costs (add \$3.5 million or \$34.6 million, respectively), for \$1.65 or \$6.99 per case averted, respectively.

CONCLUSIONS:

Our modeling shows how increasing SIA frequency in Northern regions, where RI is low and birth rates are high, while decreasing frequency in the South of Nigeria would reduce the number of measles cases with relatively little or no increase in vaccination costs. A national vaccination strategy that incorporates regional SIA targeting in contexts with a high level of sub-national variation would lead to improved health outcomes and/or lower costs.

WEB: [10.1016/j.vaccine.2019.08.050](https://doi.org/10.1016/j.vaccine.2019.08.050)

IMPACT FACTOR: 3.269

CITED HALF-LIFE: 5.50

START COMMENTARY

In this cost-effectiveness study, Zimmermann et al. tested 81 scenarios of measles supplemental immunization activities every one, two, or three years within four regions of Nigeria. Figure 4 describes the vaccine costs and total measles cases for each scenario, highlighting cost-effectiveness scenarios (defined as “scenarios which prevent the most cases for equal or lesser cost”) along the “cost-effectiveness frontier.” Authors concluded increasing SIA frequency in areas where routine immunization is low and birthrate is high and decreasing SIA frequency in areas where routine immunization is high could increase cases averted and lower costs. However, these results are limited by data available to inform this analysis. Treatment costs and costs to improve SIA are limited and could impact cost-effectiveness estimates. Data on measles incidence is also limited and could impact estimates of number of measles cases.

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5. [The cost saving opportunity of introducing a card review into measles-containing vaccination campaigns](#)

Hagedorn BL, Dabbagh A, McCarthy KA.

Vaccine. 2019 Sep 24;37(41):6093-6101. Epub 2019 Aug 27.

PubMed ID: 31471145

ABSTRACT

Measles vaccination is a cost-effective way to prevent infection and reduce mortality and morbidity. However, in countries with fragile routine immunization infrastructure, coverage rates are still low and supplementary immunization campaigns (SIAs) are used to reach previously unvaccinated children. During campaigns, vaccine is generally administered to every child, regardless of their vaccination status and as a result, there is the possibility that a child that is already immune to measles (i.e. who has had 2+ vaccinations) would receive an unnecessary dose, resulting in excess cost. Selective vaccination has been proposed as one solution to this; children who were able to provide documentation of previous vaccination would not be vaccinated repeatedly. While this would result in reduced vaccine and supply cost, it would also require additional staff time and increased social mobilization investment, potentially outweighing the benefits. We utilize Monte Carlo simulation to assess under what conditions a selective vaccination policy would indeed result in net savings. We demonstrate that cost savings are possible in contexts with a high joint probability of an individual child having both 2+ previous measles doses and also an available record. We also find that the magnitude of net cost savings is highly dependent on whether a country is using measles-only or measles-rubella vaccine and on the required skill set of the individual who would review the previous vaccination records.

WEB: [10.1016/j.vaccine.2019.08.049](https://doi.org/10.1016/j.vaccine.2019.08.049)

IMPACT FACTOR: 3.269

CITED HALF-LIFE: 5.50

START COMMENTARY

Hagedorn et al. summarized their model into three components: “a calculation of doses purchase and associated cost, an operational simulation of vaccine doses used and wasted during a campaign, and a simulation of the cost parameters and calculation of the total budget impact.” They found a vaccination card review policy may be cost-saving when vaccination coverage and card availability is high. However, the authors engaged in thoughtful discussion about the feasibility of

such a policy and potential impacts. For example, potential risks involved with implementing a card review policy could include the misunderstanding that possession of a home-based record is a requirement for vaccination or that the effort to seek out vaccination may not be “worth it” if vaccines are selectively provided. The uncertainty around the feasibility (politically and operationally) of implementing the card review strategy in a particular setting is a limitation of the study.

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6. Delayed second dose of oral cholera vaccine administered before high-risk period for cholera transmission: Cholera control strategy in Lusaka, 2016

Ferreras E, Matapo B, Chizema-Kawesha E, Chewe O, Mzyece H, Blake A, et al.

PLoS One. 2019 Aug 30;14(8):e0219040.

PubMed ID: 31469853

ABSTRACT

BACKGROUND:

In April 2016, an emergency vaccination campaign using one dose of Oral Cholera Vaccine (OCV) was organized in response to a cholera outbreak that started in Lusaka in February 2016. In December 2016, a second round of vaccination was conducted, with the objective of increasing the duration of protection, before the high-risk period for cholera transmission. We assessed vaccination coverage for the first and second rounds of the OCV campaign.

METHODS:

Vaccination coverage was estimated after each round from a sample selected from targeted-areas for vaccination using a cross-sectional survey in to establish the vaccination status of the individuals recruited. The study population included all individuals older than 12 months residing in the areas targeted for vaccination. We interviewed 505 randomly selected individuals after the first round and 442 after the second round. Vaccination status was ascertained either by vaccination card or verbal reporting. Households were selected using spatial random sampling.

RESULTS:

The vaccination coverage with two doses was 58.1% (25/43; 95%CI: 42.1-72.9) in children 1-5 years old, 59.5% (69/116; 95%CI: 49.9-68.5) in children 5-15 years old and 19.9% (56/281; 95%CI: 15.4-25.1) in adults above 15 years old. The overall dropout rate was 10.9% (95%CI: 8.1-14.1). Overall, 69.9% (n = 309/442; 95%CI: 65.4-74.1) reported to have received at least one OCV dose.

CONCLUSIONS:

The areas at highest risk of suffering cholera outbreaks were targeted for vaccination obtaining relatively high vaccine coverage after each round. However, the long delay between doses in areas subject to considerable population movement resulted in many individuals receiving only one OCV dose. Additional vaccination campaigns may be required to sustain protection over time in case of persistence of risk. Further evidence is needed to establish a maximum optimal interval time of a delayed second dose and variations in different settings.

WEB: [10.1371/journal.pone.0219040](https://doi.org/10.1371/journal.pone.0219040)

IMPACT FACTOR: 2.776

CITED HALF-LIFE: 2.70

START COMMENTARY

In this vaccination coverage study, Ferreras et al. reported 69.9% coverage of at least one dose of oral cholera vaccine (OCV) after two rounds of OCV campaigns, with a 10.9% dropout rate. Of note, a high proportion of individuals were missing vaccination cards after both rounds of vaccination despite only one- and three-month lapses between vaccination campaigns and coverage surveys. Authors highlighted this point as a major limitation of their study, but can also be an important point of intervention. Related, another limitation was the reliance on patient recall to ascertain vaccination coverage estimates. Authors also cited inadequate sample size for stratified analyses of townships.

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7. [Global oral cholera vaccine use, 2013-2018](#)

Pezzoli L on behalf of the Oral Cholera Vaccine Working Group of the Global Task Force on Cholera Control.

Vaccine. 2019 Sep 10. [Epub ahead of print]

PubMed ID: 31519444

ABSTRACT

Vaccination is a key intervention to prevent and control cholera in conjunction with water, sanitation and hygiene activities. An oral cholera vaccine (OCV) stockpile was established by the World Health Organization (WHO) in 2013. We reviewed its use from July 2013 to all of 2018 in order to assess its role in cholera control. We computed information related to OCV deployments and campaigns conducted including setting, target population, timelines, delivery strategy, reported adverse events, coverage achieved, and costs. In 2013-2018, a total of 83,509,941 OCV doses have been requested by 24 countries, of which 55,409,160 were approved and 36,066,010 eventually shipped in 83 deployments, resulting in 104 vaccination campaigns in 22 countries. OCVs had in general high uptake (mean administrative coverage 1st dose campaign at 90.3%; 2nd dose campaign at 88.2%; mean survey-estimated two-dose coverage at 69.9%, at least one dose at 84.6%) No serious adverse events were reported. Campaigns were organized quickly (five days median duration). In emergency settings, the longest delay was from the occurrence of the emergency to requesting OCV (median: 26 days). The mean cost of administering one dose of vaccine was 2.98 USD. The OCV stockpile is an important public health resource. OCVs were generally well accepted by the population and their use demonstrated to be safe and feasible in all settings. OCV was an inexpensive intervention, although timing was a limiting factor for emergency use. The dynamic created by the establishment of the OCV stockpile has played a role in the increased use of the vaccine by setting in motion a virtuous cycle by which better monitoring and evaluation leads to better campaign organization, better cholera control, and more requests being generated. Further work is needed to improve timeliness of response and contextualize strategies for OCV delivery in the various settings.

WEB: [10.1016/j.vaccine.2019.08.086](https://doi.org/10.1016/j.vaccine.2019.08.086)

IMPACT FACTOR: 3.269

CITED HALF-LIFE: 5.50

START COMMENTARY

Pezzoli et al. conducted a review of data obtained from the International Coordinating Group (ICG) and the Global Task Force of Cholera Control (GTFCC) secretariats. The ICG comprises of UNICEF,

Médecins Sans Frontières (MSF), the International Federation of Red Cross and Red Crescent Societies (IFRC), and WHO. Figure 1 shows how oral cholera vaccine doses requested, allocated, and shipped have increased since the inception of the stockpile. Despite these increases in supply, Pezzoli et al. reported difficulties in meeting demands for OCV. Figure 2 and 3 also provide informative distributions of OCVs geographically and by setting (e.g., outbreak response vs. humanitarian crisis). This study was limited in that not all data elements were reported systematically, especially campaign data.

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8. Coverage, quality, and correlates of childhood immunization in slums under national immunization program of India: A cross-sectional study

Singh S, Sahu D, Agrawal A, Jeyaseelan L, Nadaraj A, Vashi MD.

Heliyon. Sep 6;5(9):e02403.

PubMed ID: 31517125

ABSTRACT

Adequate and quality immunization coverage plays a key role in controlling the outbreaks of vaccine preventable diseases. Places where immunization coverage is low, vaccine preventable diseases contribute to worse health outcomes. This is especially true in Indian slum dwellings where 33.0% of the urban population live. The aim of the study was to explore the coverage, quality, and correlates of primary immunization under national immunization program among children aged 12-23 months, living in slums of Mumbai. A community based cross-sectional survey was conducted. Parents or caretakers of 550 eligible children aged 12-23 months were interviewed using a structured interview schedule. Regression analysis was used to detect correlates of full immunization coverage (children who received one dose each of BCG, measles, and three doses each of DPT, OPV, and HBV by his/her first birthday) and of quality immunization coverage (children who received primary vaccines at appropriate age and intervals as mentioned above and had filled immunization card). Out of total 550 children, 402 (73.1%), 131 (23.8%), and 17 (3.1%) were fully, partially, and unimmunized, respectively. Almost 86.0% children received quality immunization coverage. In the regression analysis, reminder for immunization services was found to be the single most significant correlate of full and quality immunization coverage. In this study, full immunization coverage was found to be below the expected level. This study also revealed that the awareness regarding the importance of adequate immunization was still lacking in the slum population. Emphasizing on reminders for immunization services, encouraging institutional deliveries, and scaling up use of postnatal care services may act as keys to improving the immunization coverage in Indian slums.

WEB: [10.1016/j.heliyon.2019.e02403](https://doi.org/10.1016/j.heliyon.2019.e02403)

IMPACT FACTOR: n/a

CITED HALF-LIFE: n/a

START COMMENTARY

Singh et al. conducted a community-based cross-sectional study of complete immunization in the slums of Mumbai City and Mumbai Suburban districts, home to millions of inhabitants. The authors used a multistage cluster sampling method and probability proportional to size method to select their sample. Immunization status was determined by recall, a potential limitation of the study. Variables found significant in unadjusted analyses were included in the final adjusted model. Only one variable, reminder for immunization services, was found to be significantly associated with full immunization, adjusting for other factors. The cross-sectional design of the study limits any causal inference.

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9. [Vaccination timeliness and associated factors among preterm infants at a tertiary hospital in Uganda](#)

Nakatudde I, Rujumba J, Namiiro F, Sam A, Mugalu J, Musoke P.

PLoS One. 2019 Sep 6;14(9):e0221902.

PubMed ID: 31490987

ABSTRACT

BACKGROUND:

Preterm infants are at increased risk of infections including vaccine preventable diseases. Therefore, timely vaccination is crucial to ensure adequate disease protection. Information on whether preterm infants are vaccinated according to chronological age as recommended is limited in low-income countries.

OBJECTIVES:

We evaluated the timeliness of vaccination and associated factors among preterm infants at Mulago hospital, Uganda.

METHODS:

We conducted a mixed methods study between July 2016 and April 2017. Vaccination dates of preterm infants aged 6-24 months were obtained from child health cards. Additional data were collected using a questionnaire. Five key informant interviews with health workers and two focus group discussions with caregivers were conducted. Cox regression analysis was used to identify factors associated with vaccination timeliness. Qualitative data was transcribed and analysed manually using content thematic approach.

RESULTS:

We enrolled 350 preterm infants, with a median age of 8.4 months (IQR 6.8-10.8). Less than half, 149/350 (42.6%) of infants received all vaccines within the recommended time range. Timely vaccination was highest for BCG (92%) and lowest for OPV (45.4%). Untimely vaccination was highest for vaccines administered at 6 weeks (DPT 1, PCV 1 and OPV 1) compared to other vaccines in the EPI schedule. Delivering from home or private clinics and vaccine stock-out were significantly associated with untimely BCG and OPV 0 vaccination. Low maternal education level and being very preterm were associated with untimely DPT 1 and DPT 3 receipt. Admission and long stay in the neonatal unit were associated with untimely DPT 1 receipt while extreme low birth weight was associated with untimely DPT 3 vaccination. Increasing parity was associated with untimely measles vaccination. Qualitative findings revealed that lack of knowledge and poor attitudes of health workers and caregivers, gaps in documentation of vaccination status and inadequate communication by health workers hindered timely vaccination.

CONCLUSION:

More than half of preterm infants attending a specialised clinic at Mulago National Referral hospital in Uganda did not receive vaccines within the recommended time range. Specific strategies to improve vaccination timeliness in preterm infants are needed especially among the extremely low birth weight, very preterm and those with prolonged hospitalisation.

WEB: [10.1371/journal.pone.0221902](https://doi.org/10.1371/journal.pone.0221902)

IMPACT FACTOR: 2.776

CITED HALF-LIFE: 2.70

START COMMENTARY

Nakatudde et al. conducted a cross-sectional, mixed methods study to assess the timeliness of vaccination among preterm infants at Mulago hospital in Uganda. Timeliness was defined by WHO recommendations outlined in Table 1. Several factors were found to be significantly associated with lower adjusted hazard ratios, including place of delivery, vaccine stock outs, and gestational age (see Table 5). Reasons for untimely vaccination were further explored in focus group discussions, with participants citing size and weight of infants and inadequate knowledge of health workers as reasons (see Table 6). This study is subject to recall or reporter bias. Additionally, the generalizability of this study is limited as it was conducted within a hospital setting. Despite these limitations, authors noted this study to be the first examining timeliness of vaccination among preterm infants, a particularly vulnerable population, in Uganda. The study's mixed methods allowed authors to contextualize their quantitatively findings, a strength of their study.

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10. Lessons from a training needs assessment to strengthen the capacity of routine immunization service providers in Nigeria

Arogundade L, Akinwumi T, Molemodile S, Nwaononiwu E, Ezika J, Yau I, et al.

BMC Health Serv Res. 2019 Sep 14;19(1):664.

PubMed ID: 31521155

ABSTRACT

BACKGROUND:

Health workers (HWs) providing routine immunization (RI) services play a crucial role in influencing vaccine uptake, a key determinant of improved immunization coverage. Over the years, Training Needs Assessments (TNAs) have not been routinely utilized in Nigeria to determine unmet needs of health workers offering immunization services and what approaches should be adopted to meet their training needs. The objective was to assess the level of Expanded Program on Immunization (EPI) knowledge among RI service providers and tutors in pre-service institutions in three Nigerian states, to identify unfulfilled training needs and their implications. It also sought HWs perception on a pilot training approach, where tutors will be used for in-service training.

METHODS:

TNA survey tools were designed to obtain knowledge-based information on the fundamental EPI concepts through key informant interviews and focus group discussions with 90 HWs and 27 pre-service tutors. Quantitative data was also obtained, hence utilizing a mixed method approach for the study.

RESULTS:

In spite of several previous trainings, HWs knowledge on basic immunization concepts including Reaching Every Ward (REW) strategy was varied and suboptimal. 83% of the HWs could not differentiate between the live attenuated and killed vaccines. In addition, pre-service tutors knowledge of fundamental EPI concepts, as well as HW perception of the new training approach also varied across the states.

CONCLUSION:

TNAs are valuable in determining specific training approaches to improve HWs skills needed to implement strategies required to increase vaccine uptake. However, EPI managers must be mindful of contextual factors beyond training needs such as finance and security, that can affect HW performance.

WEB: [10.1186/s12913-019-4514-2](https://doi.org/10.1186/s12913-019-4514-2)

IMPACT FACTOR: 1.932

CITED HALF-LIFE: 4.50

START COMMENTARY

In this cross-sectional training needs assessment (TNA), Arogundade et al. conducted surveys and focus group discussions to gather information about routine immunization (RI) knowledge and immunization trainings received. The study sites were purposively sampled based on variation of routine immunization capacity. As summarized, Arogundade et al. found basic immunization knowledge among healthcare workers and tutors to vary across the three states and was often suboptimal (see Figures 3–6). Additionally, Arogundade et al. also found important contextual themes that impact effective immunization training, including financial constraints and accountability at various levels. While the study may be limited by sample size and geographic location, the authors have identified knowledge gaps in both their sample of healthcare workers and tutors through this TNA. This information can inform future study of training methods, such as pre-service/in-service tutors and Training of Trainers. Perhaps more importantly, this study highlighted the variation in knowledge of topics among healthcare workers. TNAs can serve as a tool for trainers to learn of the specific needs of their trainees and to tailor their lessons to better address specific knowledge gaps.

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Appendix

The literature search for the October 2019 Vaccine Delivery Research Digest was conducted on September 23, 2019. We searched English language articles indexed by the US National Library of Medicine and published between August 15, 2019 and September 14, 2019. The search resulted in 249 items.

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]) ("2019/08/15"[PDAT] : "2019/09/14"[PDAT]))
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