VACCINE DELIVERY RESEARCH DIGEST

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

REPORT TO THE BILL & MELINDA GATES FOUNDATION

PRODUCED BY: ARAKAKI L, BABIGUMIRA JB

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List of Articles

1 A cost-effectiveness analysis of antenatal influenza vaccination among HIV-infected and HIV-uninfected pregnant women in South Africa

{Abstract & START Commentary} {Full article}

- A modeling study assessing the health impact and cost-effectiveness of influenza vaccination among pregnant women and their infants aged <6 months in South Africa.

2 Using pneumococcal carriage studies to monitor vaccine impact in low- and middle-income countries

{Abstract & START Commentary} {Full article}

- A review to evaluate the utility and methodologies of pneumococcal carriage studies to assess the impact of pneumococcal conjugate vaccine in low- and middle-income countries.

3 Determinants of timeliness in early childhood vaccination among mothers with vaccination cards in Sindh province, Pakistan: a secondary analysis or cross-sectional survey data

{Abstract & START Commentary} {Full article}

- A cross-sectional analysis of timeliness of childhood vaccination using the 2013 and 2014 Maternal and Child Health Program Indicator Surveys in Pakistan.

4 Sociodemographic and health care factors in determining immunization defaulters among preschool children in Petaling District, Selangor: a cross-sectional study in Malaysia

{Abstract & START Commentary} {Full article}

- A cross-sectional survey of immunization completeness among children attending child care centers in Petaling District, Selangor, Malaysia.

5 Global Epidemiology of Diphtheria, 2000–2017

{Abstract & START Commentary} {Full article}

- A review of global diphtheria incidence and vaccination coverage since 2000.

6 Current and new rotavirus vaccines

{Abstract & START Commentary} {Full article}

- A review of current rotavirus vaccines and future direction of rotavirus vaccine development.

7 Progress Toward Rubella and Congenital Rubella Syndrome Control and Elimination — Worldwide, 2000–2018

{Abstract & START Commentary} {Full article}

- A report on the global progress of rubella and congenital rubella syndrome control and elimination using WHO immunization and surveillance data.

8 Progress Toward Poliovirus Containment Implementation – Worldwide, 2018–2019

{Abstract & START Commentary} {Full article}

- A report on the global progress of type 2 and type 3 poliovirus containment.

9 Generating statistics from health facility data: the state of routine health information systems in Eastern and Southern Africa

{Abstract & START Commentary} {Full article}

- A review of DHIS2 health facility data to assess completeness and use of data to generate statistics from 14 countries.

10 Vaccinology in sub-Saharan Africa

{Abstract & START Commentary} {Full article}

- A landscape analysis of vaccinology research and training in sub-Saharan Africa.

Appendix

Details of Articles

1. A cost-effectiveness analysis of antenatal influenza vaccination among HIV-infected and HIV-uninfected pregnant women in South Africa

Biggerstaff M, Cohen C, Reed C, Tempia S, McMorrow ML, Walaza S, et al.

Vaccine. 2019 Oct 31;37(46):6874-6884. Epub 2019 Sep 28.

PubMed ID: 31575494

ABSTRACT

BACKGROUND:

Pregnant women and infants are at increased risk of severe disease from influenza. Antenatal influenza vaccination is safe and can reduce the risk of illness for women and their infants. We evaluated for South Africa the health effects of antenatal influenza vaccination among pregnant women and their infants aged <6 months old and assessed its cost-effectiveness.

METHODS:

We constructed a decision tree model to simulate the population of pregnant women and infants aged <6 months in South Africa using TreeAge Pro Suite 2015. The model evaluated the change in societal costs and outcomes associated with a vaccination campaign that prioritized HIV-infected over HIV-uninfected pregnant women compared with no vaccination. We also examined the impacts of a campaign without prioritization. Upper and lower 90% uncertainty intervals (90% UI) were generated using probabilistic sensitivity analysis on 10000 Monte Carlo simulations. The cost-effectiveness threshold was set to the 2015 per capita gross domestic product of South Africa, US$5724.

RESULTS:

Antenatal vaccination with prioritization averted 9070 (90% UI: 7407-11217) total cases of influenza among pregnant women and infants, including 411 (90% UI: 305-546) hospitalizations and 30 (90% UI: 22-40) deaths. This corresponds to an averted fraction of 13.5% (90% UI: 9.0-20.5%). Vaccinating without prioritization averted 7801 (90% UI: 6465-9527) cases of influenza, including 335 (90% UI: 254-440) hospitalizations and 24 (90% UI: 18-31) deaths. This corresponds to an averted fraction of 11.6% (90% UI: 7.8-17.4%). Vaccinating the cohort of pregnant women with prioritization had societal cost of $4689 (90% UI: $3128-$7294) per Quality Adjusted Life Year

(QALY) gained while vaccinating without prioritization had a cost of $5924 (90% UI: $3992-$9056) per QALY.
CONCLUSIONS:
Antenatal influenza vaccination campaigns in South Africa would reduce the impact of influenza and could be cost-effective.

WEB: 10.1016/j.vaccine.2019.09.059
IMPACT FACTOR: 3.269
CITED HALF-LIFE: 5.50

START COMMENTARY

Biggerstaff et al. conducted an analysis using a decision tree model to assess the health impact and cost-effectiveness of antenatal influenza vaccination among HIV-infected and HIV-uninfected pregnant women and their infants. Figures 1A and 1B depict a simplified version of the decision tree model structure. Table 1 shows the parameter estimates, many obtained from studies in South Africa. In sensitivity analyses, authors identified vaccine effectiveness, disease incidence, and severity of influenza illness as the most influential parameters on maternal and infant hospitalizations averted under the HIV-infected prioritization scenario (see Figure 2). Vaccine effectiveness, disease incidence, and cost of vaccine were the most influential parameters for the incremental cost effectiveness ratio (ICER) (Figure 3). All these factors (excluding cost of vaccine) can vary season to season. Influenza viruses are constantly changing due to antigenic drift, which can impact incidence and severity. New vaccines are developed every year with the intention to more effectively protect against the changing viruses; however, the degree to which those new vaccines are effective differ season to season. This study has many strengths. Authors identified several studies in the South African setting to inform their model parameters. Authors included uncertainty intervals to better contextualize their outcome estimates. Importantly, authors factored in the timing of pregnancy, influenza season, and vaccination into their analysis. A few limitations of their studies included uncertainty around their parameters due to limited information or information not specific to the population of interest (e.g., QALY), excluding certain pregnancy outcomes for which evidence is mixed, and limited generalizability to other settings. Analyses of influenza are challenging due to the ever-changing viruses and vaccines; however, Biggerstaff et al. demonstrated a potential vaccination strategy that may optimize the impact of maternal influenza vaccination in South Africa by prioritizing HIV-infected pregnant women.

Return to List of Articles

2. Using pneumococcal carriage studies to monitor vaccine impact in low- and middle-income countries

Chan J, Nguyen CD, Dunne EM, Kim Mulholland E, Mungun T, Pomat WS, et al.
Vaccine. 2019 Oct 8;37(43):6299-6309. Epub 2019 Sep 6.
PubMed ID: 31500968

ABSTRACT

Pneumococcal disease is a leading cause of childhood mortality, globally. The pneumococcal conjugate vaccine (PCV) has been introduced to many countries worldwide. However there are few studies evaluating PCV impacts in low- and middle-income countries (LMIC) because measuring the impact of PCV on pneumococcal disease in LMICs is challenging. We review the role of pneumococcal carriage studies for the evaluation of PCVs in LMICs and discuss optimal methods for conducting these studies. Fifteen carriage studies from 13 LMICs quantified the effects of PCV on carriage, and identified replacement carriage serotypes in the post-PCV era. Ten studies reported on the indirect effects of PCV on carriage. Results can be used to inform cost-effectiveness evaluations, guide policy decisions on dosing and product, and monitor equity in program implementation. Critically, we highlight gaps in our understanding of serotype replacement disease in LMICs and identify priorities for research to address this gap.

WEB: 10.1016/j.vaccine.2019.08.073
IMPACT FACTOR: 3.269
CITED HALF-LIFE: 5.50

START COMMENTARY

Chan et al. provide a summary of studies included in the review in Table 1. The review focused on cross-sectional studies, which are geared towards routine evaluation of pneumococcal conjugate vaccine (PCV) at a population level versus study designs intended to conduct research (e.g., longitudinal, cluster-randomized controlled trials). Of note, Chan et al. discussed how carriage studies can inform PCV policy, citing a meta-regression of carriage studies providing evidence for a shift from a 3+0 schedule to a 2+1 schedule in Australia. Chan et al. also called for standardization of carriage study methodology to allow for study comparisons and meta-regression analyses to identify predictors of variability between studies. Carriage studies can aid in filling current gaps in knowledge, such as in serotype replacement after PCV implementation. However, there are some limitations in that carriage studies may not capture certain invasive serotypes. For example,

serotypes 1, 12F, and 5 are highly invasive though rarely carried except in outbreaks. Therefore, continued effort to understand the transition from carriage to invasive disease is needed. A summary of advantages and disadvantages of carriage studies to examine PCV impact and monitor pneumococcal serotypes by study design and study population are provided in Tables 2 and 3.

Return to List of Articles

3. Determinants of timeliness in early childhood vaccination among mothers with vaccination cards in Sindh province, Pakistan: a secondary analysis or cross-sectional survey data

Noh JW, Kim YM, Akram N, Yoo KB, Cheon J, Lee LJ, et al.

BMJ Open. 2019 Sep 18;9(9):e028922.

PubMed ID: 31537561

ABSTRACT

OBJECTIVE: Untimely vaccination refers to receiving the given dose before (early) or after (delayed) the recommended time window. The purpose of this study was to assess the extent of timeliness of childhood vaccinations and examine the determinants of vaccination timeliness in Sindh province, Pakistan.

DESIGN:

Cross-sectional analysis of data from the 2013 and 2014 Maternal and Child Health Program Indicator Surveys.

SETTING:

Community-based maternal and child health surveys.

PARTICIPANTS:

Among 10 200 respondents of Maternal and Child Health Program Indicator Surveys, 1143 women who had a live birth in the 2 years preceding the survey were included.

OUTCOMES:

At the participants' home, an interviewer asked mothers to show their children's vaccination cards, which contained information regarding vaccinations. Children's vaccination status was categorised into timely or early/delayed compared with vaccination schedule. A logistic regression analysis using Firth's penalised likelihood was performed to identify factors associated with timeliness of vaccinations.

RESULTS:

238 children (20.8% of children who received a full set of basic vaccinations) received all vaccinations on schedule among children who received a full set of basic vaccinations. The percentages of timely vaccinations ranged from 2.3% for second measles vaccination to 89.3% for bacillus Calmette-Guérin. Child's age and place of delivery were associated with timely vaccinations. Older child age and institutional delivery were associated with decreased timely vaccination rate.

CONCLUSIONS:
Home-based vaccination record is a key tool to improve the timeliness of vaccinations. The redesigned vaccination cards, the new electronic registries for vaccination card information and the vaccination tracking system to remind the second/third vaccination visits may be helpful to improve timely vaccinations for children under 2 years old.

WEB: 10.1136/bmjopen-2019-028922
IMPACT FACTOR: 2.376
CITED HALF-LIFE: 2.00

START COMMENTARY

Noh et al. examined the timeliness of bacillus Calmuette-Guérin (BCG), polio, measles, and pentavalent (diphtheria, tetanus, pertussis, hepatitis B, and *haemophilus influezae* type b) vaccines among children in Sindh province, Pakistan. Only mothers with vaccination cards were included in the study, leaving 76.9% (7,840) of total survey respondents excluded from the study. Among the respondents, only 20.8% received timely vaccination for all vaccines. Noh et al. explored a number of potential theories to explain early or delayed vaccinations, including difficulty remembering vaccination appointments, influence from outbreaks and subsequent vaccination campaigns, and limited healthcare access. In addition to the high proportion of excluded participants, Noh et al. also noted the study may be limited in generalizability as only one province was examined. Despite these limitations, Noh et al. highlighted the high proportion of children missing home-based vaccination records and, among those children with cards, the high proportion of untimely vaccinations within this province.

Return to List of Articles

4. Sociodemographic and health care factors in determining immunization defaulters among preschool children in Petaling District, Selangor: a cross-sectional study in Malaysia

Krishna D, Mohd Zulkefli NA, Md Said S, Mahmud A.

BMC Public Health. 2019 Sep 18;19(1):1275.

PubMed ID: 31533790

ABSTRACT

BACKGROUND:

Immunization is an effective public health intervention to reduce morbidity and mortality among children and it will become more effective if the child can receive the full course of recommended immunization doses. The objective of this study was to determine the prevalence of childhood immunization defaulters and its associated factors among children below 5 years attending registered child care centers in Petaling District, Selangor.

METHODS:

This was a cross-sectional survey among mothers with children below 5 years from 60 registered child care centers in District of Petaling, Selangor. Data was collected by a self-administered questionnaire from a total of 1015 mothers. Simple Logistic Regression, Chi-square or Fisher's exact test were performed to determine the association between individual categorical variables and childhood immunization defaulters. Multivariate logistic regression was used to determine the predictors of childhood immunization defaulters.

RESULTS:

The study showed that the prevalence rate for defaulting immunization was 20.7%. After adjusting all confounders, six statistically significant predictors of childhood immunization defaulters were determined. They were non-Muslims (aOR = 1.669, 95% CI = 1.173, 2.377, p = 0.004), mothers with diploma and below educational background (aOR = 2.296, 95% CI = 1.460, 3.610, p < 0.0001), multiple children of 5 and above in a family (aOR = 2.656, 95% CI = 1.004, 7.029, p = 0.040), mothers with younger children aged 2 years and below (aOR = 1.700, 95% CI = 1.163, 2.486, p = 0.006), long travelling time of more than 30 min to the immunization health facility (aOR = 2.303, 95% CI = 1.474, 3.599, p < 0.0001) and had delayed at least one of the immunization schedule (aOR = 2.747, 95% CI = 1.918, 3.933, p < 0.0001).

CONCLUSION:

This study highlights the need of implementation of intervention programs should be intensified to improve the childhood immunization status, focusing on the Non-Muslim community, mothers with

low educational level, mothers with multiple children and mothers with children aged 2 years and below. In light of the growing problem of immunization defaulters in Malaysian children, identifying mothers at risk of not completing their children immunization schedule and educating them is an important strategy to recurrent outbreaks of infectious disease in the country.

WEB: 10.1186/s12889-019-7561-z
IMPACT FACTOR: 2.567
CITED HALF-LIFE: 3.90

START COMMENTARY

Krishna et al. conducted a cross-sectional study of vaccination incompletion, or defaults, among children aged <5 years in Petaling District, Selangor, Malaysia. Children were sampled from registered child care centers using a cluster sampling design. Authors created a 17-item questionnaire based on Expanded Program of Immunization surveys and existing literature. Vaccination data were obtained from the child's immunization records and verified with the Ministry of Health Malaysia Child's Health Booklet. Only 90 of the 1,625 mothers of children aged <5 years in the 60 child care centers did not have immunization records (see Figure 1). Authors identified booster doses more likely to be missing compared to primary doses, hypothesizing lack of awareness or forgetting as possible reasons for missing doses. Authors also found non-Muslim respondents and mothers with lower education levels to be more likely have children with immunization defaults (see Table 4), after adjusting for other factors. Given that sampling was conducted among child care centers in one district of Malaysia, findings may not be generalizable to all of Malaysia. Authors recommend further research, including qualitative research, to better understand reasons for immunization defaulting.

Return to List of Articles

5. Global Epidmeiology of Diphtheria, 2000–2017

Clarke KEN, MacNeil A, Hadler S, Scott C, Tiwari TSP, Cherian T.

Emerg Infect Dis. 2019 Oct;25(10):1834-1842.

PubMed ID: 31538559

ABSTRACT

In 2017, a total of 8,819 cases of diphtheria were reported worldwide, the most since 2004. However, recent diphtheria epidemiology has not been well described. We analyzed incidence data and data from the literature to describe diphtheria epidemiology. World Health Organization surveillance data were 81% complete; completeness varied by region, indicating underreporting. As national diphtheria-tetanus-pertussis (DTP) 3 coverage increased, the proportion of case-patients <15 years of age decreased, indicating increased protection of young children. In countries with higher case counts, 66% of case-patients were unvaccinated and 63% were <15 years of age. In countries with sporadic cases, 32% of case-patients were unvaccinated and 66% were >15 years of age, consistent with waning vaccine immunity. Global DTP3 coverage is suboptimal. Attaining high DTP3 coverage and implementing recommended booster doses are necessary to decrease diphtheria incidence. Collection and use of data on subnational and booster dose coverage, enhanced laboratory capacity, and case-based surveillance would improve data quality.

WEB: 10.3201/eid2510.190271
IMPACT FACTOR: 7.158
CITED HALF-LIFE: 6.30

START COMMENTARY

Clarke et al. conducted a review to assess global diphtheria incidence and vaccination coverage since 2000. They examined country data from the Joint Reporting Form from 2000–2017, and further data on age and vaccination status from published or gray literature. An overview of the data collected by country is presented in Table 2. Figure 4 shows high proportions of diphtheria cases unvaccinated or only partially vaccinated. Figure 6 shows the higher percentage of diphtheria cases >15 years correlates with higher national DTP3 coverage, which authors reason to be a result of an epidemiological shift in susceptible populations when the younger population is protected through higher DTP3 coverage. Limitations of the analysis include difficulties aggregating studies with heterogeneous methodologies (e.g., age aggregations) and inability to generalize results when studies may not be representative.

Return to List of Articles

6. Current and new rotavirus vaccines

Burke RM, Tate JE, Kirkwood CD, Steele AD, Parashar UD.

Curr Opin Infect Dis. 2019 Oct;32(5):435-444.

PubMed ID: 31305493

ABSTRACT

PURPOSE OF REVIEW:

As of 2019, four rotavirus vaccines have been prequalified by the WHO for use worldwide. This review highlights current knowledge regarding rotavirus vaccines available, and provides a brief summary of the rotavirus vaccine pipeline.

RECENT FINDINGS:

Data generated from use of currently available products supports their effectiveness and impact in diverse settings. Rotavirus vaccines have a favorable risk-benefit profile, but previous associations of rotavirus vaccination with intussusception necessitate continued monitoring for this rare but serious adverse event. Implementation of rotavirus vaccines was jeopardized in late 2018 and 2019 by a shortage of vaccine supply. Fortunately, with the prequalification of two additional vaccines in 2018, countries have increased choice in products with different characteristics, pricing, and implementation strategies. Other vaccines currently in development may open up further immunization strategies, such as neonatal vaccination schedules or parenteral administration.

SUMMARY:

Rotavirus vaccines have demonstrated impact in reducing diarrheal morbidity and mortality worldwide. As countries begin to introduce the newly prequalified vaccines, additional data will become available on the safety and effectiveness of those products. Products in the pipeline have distinct profiles and could be an essential part of the expansion of rotavirus vaccine use worldwide.

WEB: 10.1097/QCO.0000000000000572

IMPACT FACTOR: 3.752

CITED HALF-LIFE: 5.40

START COMMENTARY

Four vaccines are currently globally licensed, Rotarix, RotaTeq, Rotavac, and ROTASIIL. Ninety-two countries having introduced rotavirus vaccine into their national immunization programs as of 2018. Figure 1 shows a map of countries with rotavirus vaccine introduction. Table 1 summarizes rotavirus vaccines currently licensed. A challenge with rotavirus vaccination is its history with the risk of intussusception, a rare but severe condition. It is unknown why there are differences in studies of intussusception risk by country income settings, but it could be a result of decreased vaccine

efficacy in low-income settings. Promising new vaccines in development are parentally administered vaccines, such as the subunit vaccine P2-VP8-P and VP6 vaccines, which avoid issues with interference and reduced efficacy.

Return to List of Articles

7. Progress Toward Rubella and Congenital Rubella Syndrome Control and Elimination — Worldwide, 2000–2018

Grant GB, Desai S, Dumolard L, Kretsinger K, Reef SE.

MMWR Morb Mortal Wkly Rep. 2019 Oct 4;68(39):855-859

PubMed ID: 31581161

ABSTRACT

Rubella is a leading cause of vaccine-preventable birth defects. Although rubella virus infection usually causes a mild febrile rash illness in children and adults, infection during pregnancy, especially during the first trimester, can result in miscarriage, fetal death, stillbirth, or a constellation of birth defects known as congenital rubella syndrome (CRS). A single dose of rubella-containing vaccine (RCV) can provide lifelong protection. In 2011, the World Health Organization (WHO) updated guidance on the use of RCV and recommended capitalizing on the accelerated measles elimination activities as an opportunity to introduce RCV. The Global Vaccine Action Plan 2011-2020 (GVAP) includes a target to achieve elimination of rubella in at least five of the six WHO regions by 2020. This report on the progress toward rubella and CRS control and elimination updates the 2017 report, summarizing global progress toward the control and elimination of rubella and CRS from 2000 (the initiation of accelerated measles control activities) and 2012 (the initiation of accelerated rubella control activities) to 2018 (the most recent data) using WHO immunization and surveillance data. Among WHO Member States, the number with RCV in their immunization schedules has increased from 99 (52% of 191) in 2000 to 168 (87% of 194) in 2018; 69% of the world's infants were vaccinated against rubella in 2018. Rubella elimination has been verified in 81 (42%) countries. To make further progress to control and eliminate rubella, and to reduce the equity gap, introduction of RCV in all countries is important. Likewise, countries that have introduced RCV can achieve and maintain elimination with high vaccination coverage and surveillance for rubella and CRS. The two WHO regions that have not established an elimination goal (African [AFR] and Eastern Mediterranean [EMR]) should consider establishing a goal.

WEB: 10.15585/mmwr.mm6839a5

IMPACT FACTOR: 14.874

CITED HALF-LIFE: n/a

START COMMENTARY

The Table provides a summary of progress for rubella and congenital rubella syndrome (CRS) prevention and control by WHO region in 2000, 2012, and 2018. Figure 2 shows the trend of rubella vaccination by World Bank income group over time. The primary strategy for rubella and CRS control is introducing rubella vaccine into national immunization programs to susceptible populations (usually children ≤14 years). Figure 1 shows the progress of vaccine introduction and rubella elimination over time. This report is limited by the accuracy and completeness of surveillance and immunization data and the impact of recent rubella vaccine introduction may not be reflected in the results.

Return to List of Articles

8. Progress Toward Poliovirus Containment Implementation – Worldwide, 2018–2019

Moffett DB, Llewellyn A, Singh H, Saxentoff E, Partridge J, Iakovenko M, et al.

MMWR Morb Mortal Wkly Rep. 2019 Sep 27;68(38):825-829.
PubMed ID: 31557146

ABSTRACT

Among the three wild poliovirus (WPV) types, type 2 (WPV2) was declared eradicated globally by the Global Commission for the Certification of Poliomyelitis Eradication (GCC) in 2015. Subsequently, in 2016, a global withdrawal of Sabin type 2 oral poliovirus vaccine (OPV2) from routine use, through a synchronized switch from the trivalent formulation of oral poliovirus vaccine (tOPV, containing vaccine virus types 1, 2, and 3) to the bivalent form (bOPV, containing types 1 and 3), was implemented. WPV type 3 (WPV3), last detected in 2012, will possibly be declared eradicated in late 2019. To ensure that polioviruses are not reintroduced to the human population after eradication, World Health Organization (WHO) Member States committed in 2015 to containing all polioviruses in poliovirus-essential facilities (PEFs) that are certified to meet stringent containment criteria; implementation of containment activities began that year for facilities retaining type 2 polioviruses (PV2), including type 2 oral poliovirus vaccine (OPV) materials. As of August 1, 2019, 26 countries have nominated 74 PEFs to retain PV2 materials. Twenty-five of these countries have established national authorities for containment (NACs), which are institutions nominated by ministries of health or equivalent bodies to be responsible for poliovirus containment certification. All designated PEFs are required to be enrolled in the certification process by December 31, 2019. When GCC certifies WPV3 eradication, WPV3 and vaccine-derived poliovirus (VDPV) type 3 materials will also be required to be contained, leading to a temporary increase in the number of designated PEFs. When safer alternatives to wild and OPV/Sabin strains that do not require containment conditions are available for diagnostic and serologic testing, the number of PEFs will decrease. Facilities continuing to work with polioviruses after global eradication must minimize the risk for reintroduction into communities by adopting effective biorisk management practices.

WEB: 10.15585/mmwr.mm6838a3
IMPACT FACTOR: 14.874
CITED HALF-LIFE: n/a

START COMMENTARY

Current strategy of poliovirus control and elimination is striking the balance between using vaccine to control wildtype poliovirus and limiting vaccine use to reduce the risk of vaccine-derived poliovirus.

The Polio Endgame Strategy highlights the strict control of polio-essential facilities to ensure outbreaks of poliovirus through reintroduction into the population are avoided (see Figure). The Table summarizes number of polio-essential facilities with poliovirus type 2 materials by WHO region.

Return to List of Articles

9. Generating statistics from health facility data: the state of routine health information systems in Eastern and Southern Africa

Maïga A, Jiwani SS, Mutua MK, Porth TA, Taylor CM, Asiki G, et al.

BMJ Glob Health. 2019 Sep 29;4(5):e001849.

PubMed ID: 31637032

ABSTRACT

Health facility data are a critical source of local and continuous health statistics. Countries have introduced web-based information systems that facilitate data management, analysis, use and visualisation of health facility data. Working with teams of Ministry of Health and country public health institutions analysts from 14 countries in Eastern and Southern Africa, we explored data quality using national-level and subnational-level (mostly district) data for the period 2013-2017. The focus was on endline analysis where reported health facility and other data are compiled, assessed and adjusted for data quality, primarily to inform planning and assessments of progress and performance. The analyses showed that although completeness of reporting was generally high, there were persistent data quality issues that were common across the 14 countries, especially at the subnational level. These included the presence of extreme outliers, lack of consistency of the reported data over time and between indicators (such as vaccination and antenatal care), and challenges related to projected target populations, which are used as denominators in the computation of coverage statistics. Continuous efforts to improve recording and reporting of events by health facilities, systematic examination and reporting of data quality issues, feedback and communication mechanisms between programme managers, care providers and data officers, and transparent corrections and adjustments will be critical to improve the quality of health statistics generated from health facility data.

WEB: 10.1136/bmjgh-2019-001849

IMPACT FACTOR: n/a

CITED HALF-LIFE: n/a

START COMMENTARY

Summaries of reporting completeness and data quality issues are found in Table 1 and 2. Figure 1 demonstrates differences in denominator estimates between birth projections, births derived from ANC1 visits, survey crude birth rates, and DPT1 immunizations for four countries. While data reporting was found to be relatively high, Maïga et al. highlighted some gaps in data quality, such as

estimation of target populations. Maïga et al. also found use of facility data to be limited and statistics generated from facility data to be inaccessible and lacking transparency. Authors call for technological improvements to better data quality and data use.

Return to List of Articles

10. Vaccinology in sub-Saharan Africa

Moïsi J, Madhi SA, Rees H.

BMJ Glob Health. 2019 Sep 20;4(5):e001363.

PubMed ID: 31637022

ABSTRACT

We undertook a landscape analysis of vaccinology research and training in sub-Saharan Africa in order to identify key gaps and opportunities for capacity development in the field. We conducted interviews with regional and global immunisation experts, reviewed university and research centre websites, searched the scientific literature and analysed donor databases as part of our mapping exercise. We found that (1) few vaccinology training programmes are available in the region; (2) vaccinology research sites are numerous but unevenly distributed across countries and subregions and of widely varying capacity; (3) donor funding favours HIV, tuberculosis and malaria vaccine development over other high-burden diseases; (4) lack of vaccine design, manufacturing and regulatory capacity slows the progress of new vaccines through the research and development pipeline and (5) vaccine implementation research garners limited support. Regional efforts to strengthen African vaccinology expertise should develop advanced vaccinology training programmes, support clinical trial and implementation research sites in geographic areas with limited capacity and conduct multidisciplinary research to help design, license and roll out new vaccines.

WEB: 10.1136/bmjgh-2018-001363
IMPACT FACTOR: n/a
CITED HALF-LIFE: n/a

START COMMENTARY

Moïsi et al. undertook an extensive landscape analysis to assess vaccinology training and research in sub-Saharan Africa. Authors summarized vaccinology courses in Table 1 and the top diseases of interest for research in Table 2. Authors noted a lack of research capacity in regions with the highest risk of disease emergence (e.g., Nigeria, DR Congo, and Ethiopia). Some limitations to vaccinology training assessment were outdated university website information, inability to obtain number of students trained annually, and no information on the quality of training provided.

Return to List of Articles

Appendix

The literature search for the November 2019 Vaccine Delivery Research Digest was conducted on October 30, 2019. We searched English language articles indexed by the US National Library of Medicine and published between September 15, 2019 and October 14, 2019. The search resulted in 291 items.

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]) ("2019/09/15"[PDAT] : "2019/10/14"[PDAT]))