

ORIGINAL ARTICLE

FACTORS INFLUENCING COVERAGE AND KEY CHALLENGES TO ACHIEVING TARGETS OF ROUTINE IMMUNIZATION IN AFRICA: A SYSTEMATIC REVIEW

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ABSTRACT

Background: Immunization is one of the most important cost effective public health interventions available for prevention of childhood illnesses and death. Complete vaccination status rates according to the World Health Organization (WHO) vaccination schedule is low. Coverage (average) for the 3rd dose of DPT (Diphtheria, Pertussis, and Tetanus) in Africa in 2013 was 75%.

Objective: To identify the factors contributing to low coverage and the challenges to routine immunization in Africa.

Methods: review of published journal articles from Pub med and Google search

Results: Current literature has identified several barriers to immunization, including lower parental education, younger maternal age, lower income, being a female child, and larger family size. Low access to services and inadequate awareness about vaccination were also barriers to complete vaccination series. Children were more likely to be vaccinated if their mother received antenatal care during pregnancy and delivered in health facility. Health facility factors, such as long waiting times, missed opportunities and high dropout rates were associated with lower rates of vaccination. Availability of vaccines was not a major problem, but there was problem of distribution according to the need of health facilities.

Conclusion: There is a need to give health education on immunization to raise awareness of parents. Improving literacy of women, participation in household decision making also improved immunization coverage. Development and use of micro-plans, maps, and monitoring charts in health facilities improved the use of data for action. EPI training of health workers helped to provide good quality immunization service.

Parent reminder and recall systems and mass media interventions have the potential to increase immunization coverage. Verbal, video, or provider delivered communication tools may also increase parents' understanding.

Key words: Child survival, EPI, routine immunization, coverage/access

INTRODUCTION

Immunization is one of the most important and cost effective public health interventions available for prevention of childhood illnesses and death. Routine immunization is a regularly scheduled service that reaches new cohort of children. The expanded program on immunization (EPI) was launched in 1974 by the World Health Organization (WHO). Less than 5% of the world's children were vaccinated during the first year of life against six killer diseases, Polio, Diphteria,

Tuberculosis, Pertussis (whopping cough), Measles and Tetanus, later new vaccines such as hepatitis B (HepB B), Haemophilus influenza type b (Hib), Pneumococcal Conjugate Vaccine (PCV) and Rota were included. Strategies were introduced in different countries as part of immunization activities, including decision to eradicate of poliomyelitis, and the emergence of national immunization days (NID) and supplementary immunization Activities (SIA) to control of measles (1, 2).

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Children received these lifesaving vaccinations and increasing numbers are also protected by new and underused vaccines, More than 100 million infants are immunized each year saving more than 3 million lives annually (3). Global mortality attributed to measles declined by 92 % from an estimated 733,000 deaths in 2000, to 134,200 in 2016 (WHO 2016).The prevalence of Polio has declined dramatically since 1990: the number of polio cases worldwide as of 2009 was 1604, and as of August 2015 just 74 (WHO 2015). DPT3 coverage in Africa in 2013 it reached 75% (4).

Globally 21.8 million eligible children were unimmunized (did not complete 3 dose series of DPT), and 1.5 million died from vaccine preventable diseases (VPD).Out of the unvaccinated, 6.6 million were in Africa (2, 4). There is a disparity in access to most of the lifesaving EPI vaccines by children in the world today and access by children in developing countries still remains a challenge. Vaccines need to be transported at correct temperature to prevent them from either freezing or being exposed to too much heat (3). This systematic review was conducted to identify key challenges in achieving targets in Africa, focusing on assessing factors contributing to low immunization coverage, and their solution.

MATERIALS AND METHODS

The peer reviewed journal articles in Pub Med were the main source of data. A Google

search was used for more general searches, Inclusion criteria were: journals that discussed on immunization in Africa focusing on low immunization coverage and challenges in immunization services (English 1999-2014), and exclusion criteria were: Journals that were not peer reviewed or not focusing on Africa.

The methodology of data collection and analysis used by the journals reviewed in this study were Demographic and Health Surveys (DHS), WHO, UNICEF immunization coverage estimate, administrative coverage of routine vaccination, Census of households to identify those with children aged 0±2 years. WHO and UNICEF derive national coverage estimates through annual country by country review of all available data, including administrative and survey based coverage. Results of structured interviews with mothers relating to vaccination were also included. Searches were made with the following terms: routine immunization, coverage, defaulter rate, defaulter tracing, polio campaign and SIA.

The search identified 27 peer reviewed studies and a concept centered approach was used to review the articles.

RESULTS

Until 1990 less than one-half of children in developing countries completed routine vaccination programs. According to coverage data from WHO/UNICEF administrative reports, African region have shown continuing

progress, Average Coverage of DPT3 in Africa in 2011 was 71% compared to 52% in 2000. The coverage was stagnating starting from 2006, Figure 1 shows that WHO/UNICEF estimate of DPT 3 coverage at regional level was ten points lower than the

reported administrative data. Considerable disparities observed between and within countries, some decreased others showed modest increase. The region as a whole showed faltering coverage, and in 2013 reached 75% (2, 4, 5).

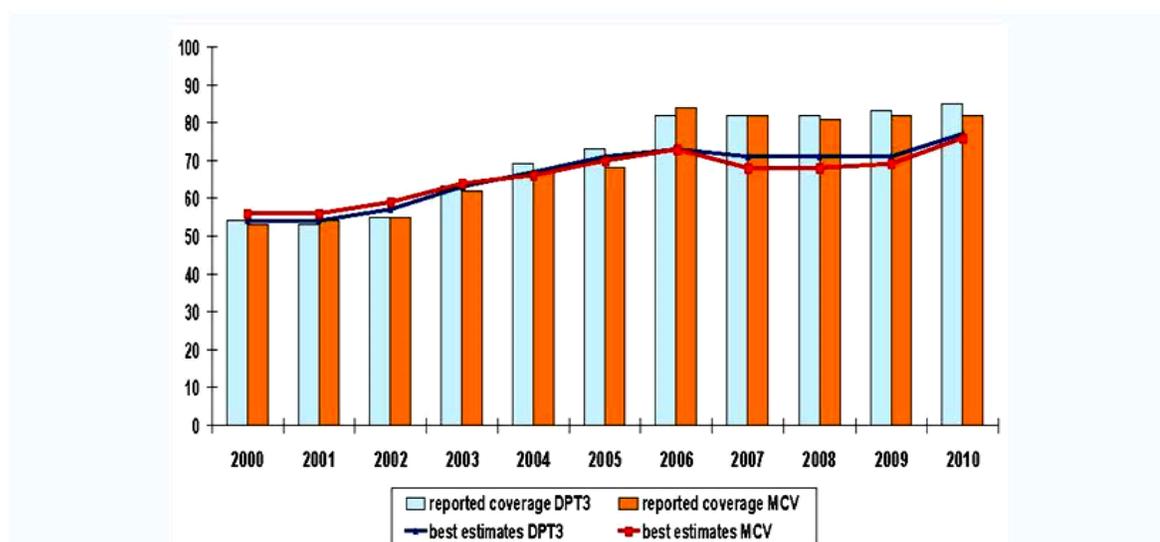


Figure 1 DTP3/MCV1 coverage for the African Region, by reported coverage and by WHO-UNICEF best estimates, 2000-2010. MCV1 - Measles-containing vaccine first dose, DTP3 - third dose of vaccine containing diphtheria toxoid, tetanus toxoid and pertussis antigens.

Current literature has identified several barriers to immunization, including lower parental education, younger maternal age, and lower income. Child's gender (being a female), large family size, low access to health services, and inadequate awareness about roles of vaccines were found to be barriers to completion of the required vaccinations. Children from poorest households were more likely remain unimmunized. In studies from Ethiopia and other low and middle income countries, low access to services and inadequate awareness of the roles

of vaccines were found to be barriers. In other studies urban children were more than two times as likely as rural children to have all basic vaccinations (6-9). Country specific examples have found that health facility factors, such as long waiting times at facilities, and shortage of vaccines were associated with low rates of vaccination. Children delivered in public and private institutions were more likely to have complete vaccinations in several countries. Recent studies suggest over reporting of individual vaccines coverage across low-

and middle-income countries (LMIC) due to inconsistent data sources (2-7).

Children were 1.35 times more likely to be fully vaccinated if their mothers participated in all household decisions than if they did not. Children with mothers who had completed secondary education were 1.77 times more likely to be fully immunized compared with children whose mothers had no formal education, which is also true for Ethiopia. Children were 2.27 times more likely to be fully vaccinated if their mother had four or more antenatal care visits than those whose mothers had no antenatal visits. Missed opportunities, and high dropout rates were major factors contributing to low immunization coverage as shown by studies done in Mozambique, India and Bangladesh (9).

Proximity to health facility, measured by the time taken to reach to the nearest health facility, was associated with full vaccination. Children from households living within a 60-minute walking distance from a health facility were more likely to complete vaccination schedules than those located farther than a 60-minute walking distance (10).

According to the 2011 Ethiopian Demographic and Health Survey (EDHS), DPT-Hep-Hib-3 coverage was 36.5% among children 12-23 months of age. National EPI coverage survey conducted in 2012 showed a higher coverage; DPT-Hep-Hib3 coverage was 65.7%, DPT-Hep-Hib 1 coverage was

80%, this shows that there is good access, but high dropout rate. The 2011 EDHS also showed that urban children were more than two times as likely as rural children to have all basic vaccinations. The difference between 2011 DHS and 2012 surveys may be due to in methodology or EPI activities two years after 2011 DHS (11, 12).

The commonest reason given for missing a child's vaccine in Western Cape, South Africa, was clinic factors, 47%, followed by a lack of information, 27%. Common clinic factors were missed opportunities, not being told by nurses to return, and being given incorrect return dates by clinic staff. The overall drop-out rate of fully immunized children between 9 and 18 months of age was 24.5% (11.8% between DPT1 and DPT3), higher in Ethiopia 26.6% among 12-23 months (DPT1 and DPT3). The results indicate that the Western Cape is at risk for an outbreak of preventable childhood diseases and it is likely that this is also the case for other provinces of South Africa and Ethiopia. Late first vaccinations in urban areas herald later general defaulting (11- 15).

In study done in Malawi, mothers observed lack of skill of some vaccinators, who did not know how to inject properly, because blood oozed from the injection site. Health workers seldom had time to provide vaccination information during vaccinations sessions. In the study from Ethiopia, mothers stressed

that health workers were not interested in teaching mothers about immunization during the vaccination sessions. The absence of proper birth registration data can lead to inaccuracies in reported coverage. No country in Africa had efficient system for tracking and motivating the parents of dropouts and no acceptors. Findings in Bangladesh, Ethiopia, and India showed that, there was usually no list of dropouts. In Malawi, mothers were informed if the vaccination status of their children was inadequate when they attended for curative services. There were various reasons why women did not present their chil-

dren for vaccination. Heavy work-loads, illness, attendance at funerals, flooding of roads, and excessively hot weather were some of the reasons mentioned by women who could not attend vaccination sessions. In some studies, noncompliance with the immunization schedule was related to parents' lack of time (40.3%), forgetting to return (33.2%), losing the immunization card (10.3%), travels (7.7%), and lack of money (1.1%) (9, 16). Table 1 and 2 summarize barriers to immunization

Table 1: Barriers to Immunization (Parental factors)

- Lower parental education
- Younger maternal age
- Female gender of child
- Larger family size
- Poverty
- Heavy workload of the mother
- Poor community participation and ownership
- Mother's not participating in decision making
- Forgetting when to return
- Proximity to health facility
- Home delivery

Table 2: Barriers to Immunization (health facility factors)

- Irregular vaccine delivery
- Poor health worker skill
- Lack of monitoring
- Rude service providers
- Missed opportunities
- Absence of birth registration
- Poor community participation and ownership
- Long waiting time at health facilities
- Failure to pass immunization message by health worker

Discussion

Immunization is one of the important and effective child survival strategies. Vaccine Preventable Diseases (VPD) contributes 16-29% of child mortality in resource limited settings (7, 24, 25). Complete vaccination status rates in Africa, according to the World Health Organization (WHO) vaccination schedule is low. Coverage (average) for the 3rd dose of DPT in Africa in 2013 it reached 75%, compared to 96% in Western Pacific and European region. Reaching everyone with health services has always been hard, and reaching the last 20% is harder still. And those who need the services most-the “hard-to-reach” tend to be the ones who receive them least (2-4).

Strong health system is necessary for delivery, barriers identified urban settings were, lack of financing, human resources and vac-

cines and supplies. Lack of vaccines has been reported to affect service utilization negatively. Assessment by Global Alliance for Vaccines and Immunization (GAVI) revealed that availability of vaccines is not the major problem, what is needed is a functional delivery system, a trained workforce to deliver the vaccines and increased community participation. The health sector should provide mothers with information regarding access to vaccinations education on their importance prior to delivery. Association between women’s decision making autonomy and vaccination highlights the need for initiatives that improve their autonomy in order to attain gender equality. The use of ANC during pregnancy and institutional delivery encourages the use of health services including immunization (6, 8, 9).

The combined effect of distant facilities and few service providers resulted long waiting times before receipt of services at public facilities. Safety concerns for the child, rude service providers, and unqualified workers were major concerns for consumers. Service provision was further hindered by the lack of transport. Health worker motivation in urban areas is often low because of the high cost of living, may be increased by involving them in evaluations and providing them with verbal and written feedback. High vaccination Coverage citywide may conceal pockets of low coverage that act as foci for continuing transmission of target diseases, and many defaulters. It is necessary to increase community motivation and to ensure that children complete the immunization series. In Mozambique, health staff and community representatives conduct house to house visits to identify eligible children and refer them to the nearest health center or outreach session. Improving disease surveillance data can identify high-risk populations and provide information about the effectiveness of EPI (7, 26). The presence of health extension workers at the lowest administrative level in Ethiopia is an excellent opportunity to reach every child and to mobilize every family for routine immunization and for SIAs. (4, 8, 17).

Childhood immunization programmes in sub-Saharan Africa show that parent reminder and recall systems and mass media interventions have the potential to increase immun-

ization coverage. Verbal, video, or provider delivered communication tools may also increase parents' understanding, especially if the tools are structured, tailored and interactive. Increased political and financial commitment from governments by all immunization stakeholders are needed to maintain achievements and make additional progress in EPI. As part of routine immunization Child Health Days (CHD), which include vitamin A supplementation, deworming and ITN distribution, and Immunization Plus Days (IPD) are carried out have been conducted in some African countries and found to be cost effective (2, 5, 18).

The quality of immunization data in many African countries is questionable. Various external evaluations have identified many inconsistencies in reported data suggesting that immunization data monitoring remains weak in most African countries. Recent studies suggest substantial over reporting of individual vaccines coverage across low- and middle-income countries (LMIC) due to inconsistent data sources, therefore population-based surveys are often the best available means to estimate vaccination coverage at both local and national levels. (1, 19, 20, 21) The Reaching Every District (RED), now renamed as reaching every child (REC) initiative strategy involves prioritizing low-performing districts by strengthening five important immunization functions at the district level. These functions are planning and

management of resources, capacity-building through training and supportive supervision, sustainable outreach links between communities and health facilities, active monitoring and use of data for decision-making. The development and use of micro plans, maps, review meetings and wall monitoring charts facilitated the use of data for action. Health facilities can improve stock management through estimation of vaccine needs, thus reducing the risk of having to cancel sessions due to inadequate stock and reaching every child (1, 2, 5, 19, 21).

Measles kills more children than any other EPI target diseases. The large number of confirmed measles outbreaks and cases that occurred among unvaccinated children aged <5 years indicates the likely cause of the outbreaks was an accumulation of susceptible individuals who were not reached by routine vaccination services or during measles SIAs (2, 17).

The required level of immunity in populations to prevent epidemics of infectious diseases has been estimated at about 95% and 85% for measles and polio, respectively, achieving and maintaining $\geq 90\%$ MCV1

coverage nationally and $\geq 80\%$ in each district is recommended (14, 21, 25, 27).

Supplementary immunisation activities improved in measles and routine immunization coverage in later infancy and reduction in inequalities. New vaccine delivery strategies have also helped to reach the hardest to reach children in Ethiopia and other parts of sub-Saharan Africa (14, 17, 22)

Findings from district level case studies in three African countries (Ethiopia, Cameroon and Ghana) on coverage and trends showed four direct drivers of routine immunization; cadre of community centered health workers, health system and community partnership, regular review of programme and health workers performance, and Immunization service tailored to community needs. The enabling factors were political and social commitment and the actions of development partners, which created supportive conditions. Each was present in some way in better performing districts and was either absent or where coverage was weak (23). Table 3 explores some of activities for raising immunization coverage.

Table 3. Activities to raise immunization coverage

- Sustained outreach link between community and health facilities
- Use cadres of community health workers
- Immunization services tailored to community needs
- Capacity building and supportive supervision
- Active monitoring and use of data for decision making
- Prioritizing low performing districts
- Planning
- Management of resources
- Health workers monitoring
- Regular program review
- Political and social commitment
- Action of development partners

Limitation of the review

The review demonstrates immunization in Africa and challenges focusing on assessing factors contributing to low immunization coverage. The situation in different countries is different, factors contributing to problems may differ, but there are also common factors which apply for many African countries. It would have been good to assess those contributing to Ethiopia, but it was difficult to find enough published evidence

In some studies conservative estimate that complete vaccination status had to have a health card with time documentation. Although this allows for the potential of underestimating vaccination coverage by not including vaccinations that had missing health cards.

Some of the analysis of coverage and disease

incidence trends were carried out with data submitted by countries through the WHO/ UNICEF joint reporting form and were not independently validated or cross-checked.

Conclusion and Recommendation;

Many concerns related to health system issues such as stock outs and long wait times, should be addressed as part of a wider approach to improve health systems. Access to, and timeliness of vaccinations, quality of service delivery need to be improved, poor infrastructure, and immunization monitoring are among the many challenges faced by most African countries, all requiring evidence-based interventions.

Association between women's decision making autonomy and vaccination shows the need to attain gender equality, and provide information and education on benefits of childhood vaccination is important.

Antenatal care is a good opportunity to provide mothers with information about vaccination.

Mass campaigns for measles and polio should be continued until coverage is sus-

tained above 90%. Identifying and reaching low coverage neighbourhoods. Improving disease surveillance can identify high risk populations and provide information about the effectiveness of EPI.

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