

A Review of Factors Influencing Routine Immunization Coverage and Vaccine Program Effectiveness in Africa

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ABSTRACT

Immunization is a straightforward part of preventive health and has slashed incidences of some associated diseases spectacularly, especially in Africa where these diseases contribute predominantly to high mortality. Generally, vaccines are amongst the most cost-effective interventions in global health, yet achieving equitable immunization coverage in the continent is perennial. This is a comprehensive review of challenges that re-equate universal immunization coverage in Africa where social, economic, infrastructure, and cultural factors were discussed. Remote regions experience lack of healthcare services and struggle to access vaccines and those living in urban environments are exposed to misinformation and thus, doubting the trustworthiness of health care services. Also, individuals from low-income families who cannot afford the indirect costs of vaccination continually contribute the problem. Lack of political support, grossly underfunded health systems and weak surrogacy also weaken immunization programs through inadequate staffing, lack of adequate vaccine supply and cold chain maintenance embarrassment. The review also captures success stories of

immunization including the introduction of the MenAfriVac, meningitis belt in Africa which rapidly has reduced cases of meningitis. Also, the vaccination campaigns in Ghana and Malawi showed high success as a result of political commitment coupled with funding and community ownership. The review recommends urgency of the promising call to surmount the barriers with a corresponding vaccine program monitoring and evaluation to preach the immunization progress across Africa.

Keywords: Immunization coverage, vaccine hesitancy, vaccine-preventable diseases, Africa

INTRODUCTION

Immunization is an important preventive strategy in the control of vaccine preventable diseases and contributes immensely in cutting down morbidity and mortality in child bearing age, especially in Africa, where, such diseases contribute to child mortality. Vaccines have been considered one of the most valuable cost-wise measures in public health, which can prevent 3 million deaths annually (UNICEF, 2022). However, attaining imbalanced immunization coverage sustainable goal is still a hard nut to crack in

the African Continent. Challenges that immunization programs encounter in Africa include structural barriers as well as social cultural barriers. Many people living in the continent suffers inadequate health facilities and therefore, experiences difficulty getting to vaccination sites. Also, on the other hand, urban settings are still lagging behind on vaccination because of false myths, disbelief in modern healthcare, and other life exigent medical needs. These challenges are magnified by the economic aspect as most families with low purchasing power cannot afford related expenses such as transport or lost working days (Dube *et al.*, 2022). Instability of political leadership system in many of the African countries is also a major factor that hampers immunization drives. It undermines supply chain delivery and displaces populace, besides denying health care workers means to access vulnerable communities. Furthermore, whether through poor funding for health systems or low-income country health budgets, funding challenges results to inadequate recruitment of health workers, shortage of vaccines and unavailability of necessary infrastructures which further deteriorates cold chain as important for sustaining vaccine effectiveness (Gavi, the Vaccine Alliance, 2023). Nevertheless, there has been some achievement in the region owing to various reasons. For example, in the African meningitis belt, cases and fatalities from meningitis A, that was treated by the MenAfriVac vaccine have dropped more than 90% in countries that accepted the new vaccination (Greenwood *et al.*, 2023). Similarly, Ghana and Malawi have good models of targeted vaccination campaigns with sufficient political will, sufficient funding, and the communality (PATH, 2023). This review aims to attempt and capture the literature on the determinants of routine immunization, factors influencing immunization coverage and vaccine program effectiveness, as well as, explore the success of vaccine programs in Africa. In this paper, the above determinants were discussed in details to further comprehend the existing

flaws and enhance the immunization situation in the continent. The results of this review sought to inform relevant stakeholders to solidify effective immunization service delivery through appropriate monitoring and evaluation of vaccine programs to target immunization needs in Africa and offer solutions supported by sound growth strategies fit for the African people.

Factors Influencing Vaccine Program Effectiveness in Africa

Socioeconomic and Cultural Factors

Apart from biologic factors, several studies have identified the following as the most compelling predictors of routine immunization coverage in Africa: socioeconomic and cultural factors. The general poverty level is a major issue, since many families are unable to afford preventative care, including simple child immunizations. In low-income households, parents always pay the price for immunization in one way or the other: the cost of transportation to the health facilities or the wage that they lose by taking time to immunize their children (World Bank, 2022). The analysis of sources suggests that higher income is associated with higher vaccination coverage, which increases the significance of economic wellbeing for healthcare (Funk *et al.*, 2022). Hypothesis Cultural beliefs and practices also add to the argument too. In many contexts, there are cultural perceptions of disease that differ with the medical science practices in the current society. For example, some parents may believe that their child's sickness, such as measles, or polio, is caused by witchcraft, and therefore they seek herbal treatment from traditional healers instead of getting their child a vaccine. Immunization is also affected by gender relations because control over decisions on when to take children for immunization lies with male heads of households may not know the importance of immunizations or have other priorities for the family (Dube *et al.*, 2022). Another determinant is education which explains the differential spending pattern of

the two regions. It was also concluded that parental literacy and knowledge on immunization had direct impact on vaccine acceptance. Quest items for parents can be identified as educated parents who will trust healthcare providers and recognize vaccine schedules as well as disprove myths regarding vaccine safety. On the other hand, in areas where people have little reading ability, they are more likely to fall for fake news on the necessity of taking the vaccine. For example, a study in Nigeria found that due to fear of side effects in vaccines that they received through hearing rumors this made users reject polio vaccines in particular communities (WHO, 2022).

Logistical and Infrastructure Challenges

Logistics and infrastructure are well understood to be major issues in Africa especially in the rural and hinterland regions. The lack of Heart of Africa's accessibility and its bad roads make it hard to get to some of these isolated areas in the continent. Each healthcare worker or community health volunteer may have to walk formidable distances or use the worst means of transport to get vaccines to remote areas (PATH, 2023). This is aggravated by an inadequacy of functional healthcare facilities in the region, thus families move up to several kilometers to get vaccination services. A major weakness faced by the African nations is that the cold chain system used to preserve the potency of the vaccines is not easy to manage. Most of the rural health centers do not have a steady source of power supply and the temperatures required to store vaccines are hard to achieve. The Vaccine Alliance (Gavi) reported that in 2023, of the health facilities in sub-Saharan Africa, 59% suffer frequent power outages that affect the quality of vaccines. Solutions like solar-powered fridges are available, but their usage is still constrained by issues to do with funding and implementations. Lack of human resource is also destabilizing immunization programs. Most African countries have a serious shortage of trained health care human resources which show low doctor to patient

ratios that are way below the WHO standards. Health care workers may be reluctant to conduct outreach programs due to demotivation resulting from inadequate remuneration or burnout due to excess workload and attached pressure as useful windows of opportunity for vaccinations to be missed (WHO, 2023).

Policy and Governance Setbacks

In more detail, the responsiveness and structure of policies and governance systems are critical predictors of immunization programs. Enhanced political commitment can help create resource channeling mechanisms, focus on the combination of prevention measures and the establishment of international cooperation with other organizations. This indicates that countries like Rwanda show that comprehensive and integrated intersectoral cooperation can get immunization levels to near universal rapidly. Copied The Rwandan success has been to have incorporated vaccination into the general health systems improvement, thus overcoming challenges relating to logistics, and finance (UNICEF, 2022). On the other hand, high ill-governance co-integrated with unstable political settings complicate immunization. Violence and social turmoil force people to flee, dismantle centers and leave conditions that fail to support vaccination. For instance, in South Sudan, the civil war act of violence that has continued to destabilize a country that has not known peace sees millions of people lacking access to health care services to counter diseases such as measles and cholera MSF, 2023. Two areas where competition has most of its challenges are: Funding is another one of the major obstacles. The problem, however, is that most African countries depended on donor funding to support immunization programs and thus, changes in the donor community funding can disrupt supply and service delivery gaps. While countries like Nigeria have moved rapidly from implementing donor funded programs for financing to domestic financing, problems are then observed in

retaining coverage levels (Gavi, 2023). One issue of importance is inadequate financing of public health, hence, the need to strengthen public health financing and attain sustainable sources of funding.

Limited Community Engagement and Trust

Effective immunization requires a strong involvement of the community. Opinion makers such as political champs, religious personalities, and other community champs have major some influence on the decision making of the population. For instance, while implementing religious leaders' surround to immunization improvement in some communities, it was noticed that immunization coverage was improved significantly in those regions where communities were not previously receptive (PATH, 2023). Hindrances such as misconceptions and vaccine doubts are the significant challenges towards immune coverage. Lately, social media has been used to spread misinformation when it comes to vaccines, where certain individuals post information regarding its infertility capacity, its ability to cause severe side effects or concocted conspiracy theories which deter people from getting vaccines. Conducted research in Kenya also showed that more than 40 percent of the parents who declined the vaccination, gave reasons anchored on rumors and myths (WHO, 2023). In this context, involving people about any disease or innovated idea requires trustful

interaction, cultural taboos free awareness creation and continuous involvement of communities.

RESULTS

The following section gives the findings of the study on routine immunization coverage across Africa. The analysis of the findings is further complimented by figures to semiotically amplify the current status, differences, and patterns of immunization and other factors that shape immunization programs across Africa.

Immunization Coverage Rates by Country

The immunization coverage in the various African countries remains a mixture of the political, economic, and social events. Figure 1 illustrates that high rates of IMs have been successfully attained in Rwanda and Ghana at over 90%, this is due to strong national health programs and community mobilization. These nations have been able to form partnerships with the WHO and Gavi, to ensure its access to vaccines that are constantly flowing in. On the other hand, there are nations like South Sudan, Chad, Central African Republic where the coverage level is much lower and almost in a certain percentage below 50% (WHO, 2023). These areas suffer from weak health systems, continued political instability, and limited resources to purchase vaccines. Such countries' rural populations are most vulnerable since vaccine delivery to areas with poor infrastructure is almost impossible.

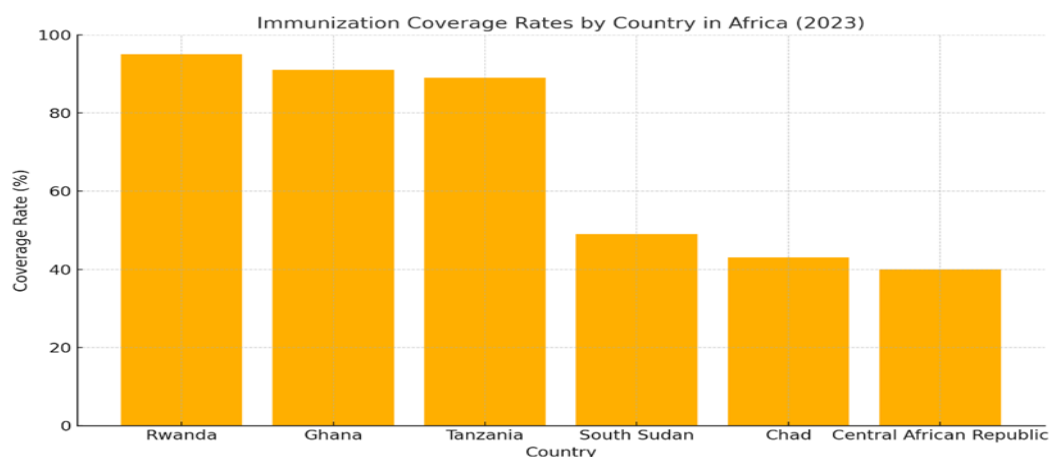


Figure 1. Immunization coverage in Africa varies widely across countries

Reduction in Vaccine-Preventable Diseases Over Time

During the past twenty years, there are tremendous changes in the levels of vaccine-preventable diseases in many African countries. For instance, Figure 2. illustrates the trend in the cases of meningitis A in the African Meningitis Belt before and after the Mena AfriVac vaccine was introduced reducing incidence by over 90%. The success illustrated here shows how effective targeted immunization campaigns could be where political will, sufficient funding and

community support is available. However, various difficulties in the organization arise from the areas that face political instabilities. For instance, South Sudan, the Democratic Republic of Congo occasionally goes through a disease such as poliomyelitis or measles leaving the rest of the world that had deemed them eradicated surprised. These outbreaks are usually associated with disruptions of vaccination activities due to conflict and insecurity affecting health worker access to affected populations.

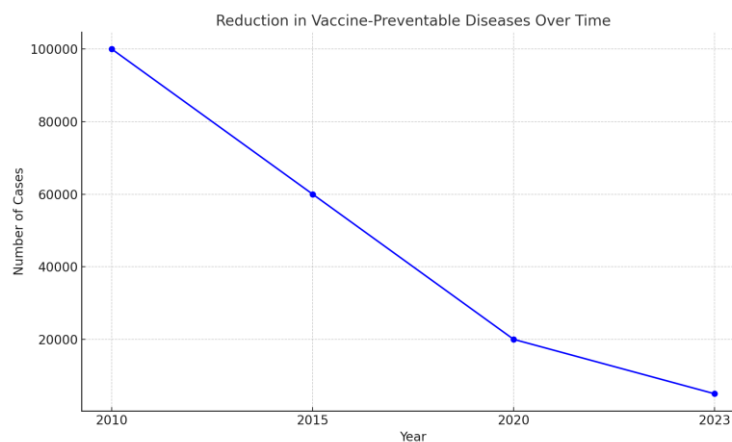


Figure 2 The number of cases of meningitis A in the African meningitis belt

Barriers to Effective Immunization Coverage in Africa

The associated barriers to immunization in Africa are outlined below in figure 3. Cohort c which is logistical issues forms the largest percentage while economic and cultural barriers make the second and third largest percentage respectively. To tackle these challenges, there is need for effective specific programs and unique approaches. There are several unchanging challenges that affect immunization programs throughout Africa. These could be classified under logistics, cost, cultural, and political challenges. Transportation problems are considered one of the greatest barriers to immunization, especially in hard-to-reach regions. Due to lack of adequate health systems, lack of transport facilities and inefficiency in proper storage amenities common to many developing countries. At times even when vaccines are available, they

do not reach these targeted population due to weak infrastructure and poor logistical arrangements. This is further magnified by economic barriers, while several families, particularly in developing countries, cannot bear downstream cost of vaccination. Another difficulty is socio-cultural barriers resulting in vaccine hesitant due to misinformation propagated, skepticism regarding government funding and support in health matters, and culture. In many regions, there are myths regarding vaccine adjuvants or associating vaccines with infertility, or including the latter in plots of foreign origin, which has resulted in the population refusing to get vaccinated. Such misconceptions are further affirmed by religious or community leaders, who resist the immunization process, and therefore health authorities struggle to engage resident populations in the vaccination process. Conflict enhances vulnerability to poor level of political

instability that negatively affect immunization efforts in insecure regions. Vaccination campaigns are frequently interrupted in war and politically unstable countries, and healthcare workers cannot access the targeted populations. Furthermore, these conflicts lead to damage of health facilities, and interrupt the supply of vaccines and medical equipment that are often in short supply anyway. All these

factors affect the ongoing efforts to enhance immunization coverage as vaccine programs are constantly thwarted. Mitigating these challenges calls for increased and effective healthcare funding as well as health systems preparedness to aggrandize community health, through education, and most importantly, steadfast political will to ensure vaccine program effectiveness in all administrative regions.

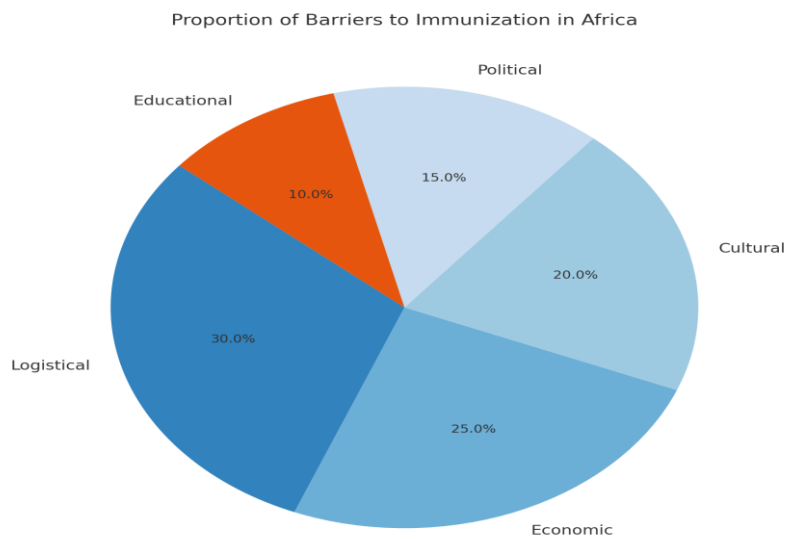


Figure 3: Major barriers to immunization in Africa.

DISCUSSION

As the Africa continent battles immunization coverage and Vaccine program effectiveness in majority of the countries, there is a gap in economic status' immunization rates, as the 40% of wealthier households fully immunize their children, while the remaining 20% of the poorest households do the same, according to World Bank (2022). Transportation and vaccine education also remain unfavorable and further widens the gap. Culture and gender come up as key barriers to vaccine uptake. Concerns based on half-baked biological concepts and faith have also fed suspicion as some churches have linked AEFI attributed to vaccine uptake a causal factor of infertility (WHO, 2023). Even today, there are critical infrastructural constraints still in place. This results in inadequate infrastructure for roads and a weak cold chain system to distribute

vaccines especially to arid rural areas. However, this has been partly surmounted through Solar-powered cold chain facilities that aims to address energy challenges but the problem still persists in many regions due to lack of funds (PATH, 2023).

Top on the list is political stability and it cannot be overemphasized. Those societies stricken with such a situation for long periods have supply chain interruptions and shortages of health care providers. For instance, as a result of political conflict in South Sudan, there has been disappearance of health facilities that prompted outbreaks of some diseases that can otherwise be prevented through immunization. For example, measles according to MSF, 2023. A new form of emerging extortion is acquiring recognition – vaccine reluctance. According to a study conducted in Kenya, the percentage of parents who opted to reject

vaccination had health misinformation is at 42% (UNICEF, 2022). Educational messaging, especially culturally appropriate one, and encouraging local authorities and stakeholders showed positive results in combating reluctance in Ethiopia and Uganda (PATH, 2023). Out of all the countries, one can look at Rwanda as a model on immunization success. Systematic integration of RI into the overall healthcare framework, commitment from the governments and social investment with partnership, have supported the rates of RI to be in over 90 % mark. Ghana too has shown that with the support of the community health workers, it is possible to increase the uptake and knowledge of vaccines within the rural population (UNICEF, 2023). Multilateral institutions that have supported and overseen campaigns have included Gavi and WHO in this case. A specific example is that MenAfriVac has in practicality eliminated meningitis Group A in the African meningitis belt, which shows the significance of Country specific vaccines (Greenwood *et al.*, 2023).

CONCLUSION

Immunization is one of the key essential preventive interventions that has been implemented as a cost-effective mechanism of alleviating many of the vaccine-preventable diseases in Africa but to be able to reach for the ultimate and broad level of equitable immunization coverage, there are socioeconomic, cultural, logistical and in essence governance barriers that poses threats to the program's effectiveness through poor economic status, tradition, belief, and under-funding which all hinder vaccination drives. This review has also drawn attention to success stories which include the Rwandan and the Ghanaian experiences attributed to political commitment, innovation and community participation and have resulted in high immunization coverage. These cases can serve as good examples for other nations in the continent willing to enhance their immunization coverage significantly.

However, attaining remarkable shift in immunization coverage demands complex multi-faceted solutions, centered largely around improving the investments in the HC system, implementing technology for logistic issues, overcoming community mistrust and strengthening the IPC cooperation. Therefore, enhancing routine immunization coverage and the efficiency of the overall vaccine program in Africa requires collective synergy of governments, health care providers, relevant global agencies, and community partners. The various challenges the continent faces require commitment and creativity to change so as to realize the noble goal of all citizens access to vaccines and thereby, save the future generation from diseases that can be prevented.

Declaration by Authors

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