

Vaccination Coverage and Sustaining Control of Measles in Africa: A Global Health Perspective

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Editorial

For over 50 years, a safe, effective and inexpensive vaccine has been in use but several challenges continue to hamper universal coverage and the sustained control of measles. Before the year 2000, measles was killing over 700,000 children each year worldwide of which 60% occurred in Sub-Saharan Africa [1]. Epidemiologic reports showed that although an estimated 15.6 million deaths had been prevented by measles vaccination between 2000 and 2013, progress has stalled and previous gains are being reversed [2]. Measles related deaths vary depending upon the average age of infection, the nutritional status of the population, measles coverage, HIV infection, vitamin A deficiency and access to health care [3]. The death rate due to measles is so high in Africa that, on average, a child dies every minute. To make the matter worse, every person with measles has a 90% chance of infecting people with whom they come into close contact, if they are unvaccinated [1]. Yet a single dose of measles vaccine is proven to be 93% effective at preventing disease in vulnerable populations exposed to the virus at a relatively low cost (\$1 US dollar). The fact that many lives are still lost to this vaccine-preventable virus remains a key concern for global health.

In this editorial letter we examine two Sub-Saharan African countries; Tanzania and Ethiopia as case studies and their implemented efforts towards the eradication of measles in the last 15 years. Since 2000, Tanzania has had tremendous success in measles vaccination coverage reaching 99%. Ethiopia's measles vaccination coverage has also nearly doubled to reach 70% in children 12-23 months old, but this rate still falls far below the 95% vaccination target required to protect the entire population. The goal of this paper is to summarize some reasons for persistence of measles and some lessons that can be learned to foster further improvement in the control of measles in the Sub-Saharan Africa region.

In 2000, WHO AFRO devised a strategic plan to reduce measles-related mortality in sub-Saharan Africa. The plan included 1) increasing measles vaccination coverage by increasing routine health services, 2) giving all children the opportunity to receive two doses of the measles vaccine, 3) increasing detection of new measles cases, and 4) improving the care of those diagnosed with measles. Routine health services are regularly scheduled times a child visits a health professional. At these times, the child can receive their vaccinations. Prior to 2000, these services were somewhat successful in providing the first measles shot but not the second. It is important that children receive two vaccine doses to provide 97% protection. In order to increase chances that a child receives vaccination twice, the WHO AFRO recommended the implementation of Supplementary Immunization Activity (SIA) in African countries [1,4]. Although this is a well-focused public health strategy towards limiting the deleterious health outcomes from measles sustaining its implementation is often challenging [2].

Ethiopia has made great strides in reaching 76% measles vaccination coverage but, this level is still below the target vaccination that would provide population protection or 'herd' immunity [5]. The World Health Organization declared that Ethiopia is experiencing an "ongoing measles outbreak", with over 14,000 reported cases in 2014 alone [1]. Multiple factors have contributed to the challenges in the control of measles in Ethiopia. First, the population of Ethiopia stands at about 94 million, with a much larger proportion of rural inhabitants. In rural areas, routine vaccination coverage for measles and other diseases remains patchy and inconsistent because of poor access to primary health care clinics [6]. Outreach mobile vaccination services to the rural areas should be considered as an alternative approach. Second, Ethiopia is home to multiple internally displaced populations and refugees from Somalia, Eritrea and South Sudan who live in refugee camps. The vaccination status of refugees is often unknown, and when they mix within a population like Ethiopia

that has not reached herd immunity, measles could spread that much more potently. Setting a routine system to establish the vaccination status of all refugees at reception and 'catch-up' vaccination programs to cater to the unvaccinated persons could be valuable for achieving sustained measles control.

Third, Ethiopia suffers frequently from severe drought and famine which leaves many children severely malnourished and highly vulnerable to diseases. The death rates among children in such situations of complex emergencies have been reported to be more than twice as high as in normal populations. For example, during a famine in Ethiopia, measles alone or in combination with wasting accounted for 22% of 159 deaths among children younger than five years of age, and 17% of 72 deaths among children aged five to fourteen years [6]. Therefore, special efforts to increase vaccination coverage in emergency situations must be given highest priority. Finally, Ethiopia's economy is still very weak with a GDP per capita of US\$ 565 with 5.1% expenditure on health, indicating inadequate financing of the health system. Despite all the current challenges, there is evidence of political support. For example, the Ethiopian government has endeavored to support vaccination, by offering monetary incentives for vaccination for families in lower income categories [7]. Given the limited monetary resources, we suggest that sustainable alternative approaches to incentivize vaccination in poor families should be sought.

Today, Tanzania on the other hand, has a remarkably high rate of 99% for measles vaccination coverage. The current population of Tanzania is 49 million, with a GDP per capita of about US\$ 998 and 7.3% expenditure of healthcare. Although the economies of both Tanzania and Ethiopia are generally similar, lessons can be learned from Tanzania's success story. For example, various methods have been employed to achieve universal measles vaccination in the rural and urban environment. In the rural part of Tanzania, where 69% of the population resides, greater success has been achieved using SIA whereas routine vaccination has been shown to work well in more urban settings [4]. This suggests that the public health programs must be tailored appropriately to the sub-population of each country.

In addition, the public health response to a large measles outbreak that occurred in 2006 in the commercial capital of Tanzania, Dar es Salaam led to the development of a better integrated health system. This improvement in health system has resulted in better control of measles and other diseases. The response constituted immediate outbreak investigation, heightened surveillance of current and possible new cases and a vaccination campaign. The campaign entailed mass vaccination of children six months through fourteen years residing in Dar es Salaam because the vaccine can stop disease progression if given within 72 hours. The campaign was successful in vaccinating 100% of children, halting the outbreak, and leading Tanzania into a measles free era of 99% coverage [4]. The outbreak provided some important lessons regarding gaps in coverage and the role of unpredictable events.

In general, measles is affecting the poorest children from families for which seeking treatment can have a devastating impact on household income. Furthermore, local contextual factors continue to hinder routine immunization services in the African region including civil unrest, lack of human resources within health ministries, and limited funding for routine immunization services [8]. Specific lessons can also be learned from developed countries where there is a decline in mortality from measles. The sustained decline in measles has been associated with economic development, improved nutritional status, supportive care, and antibiotic therapy for secondary bacterial pneumonia, as well as the widespread use of measles vaccine [1]. These aspects should be incorporated into country-level policies for the management and control of measles since they have been shown to work.

In conclusion, the factors that hinder sustained success of measles programs are multi-faceted, and relate to the population, the policies, the politics, and provision of health services. Public health interventions, such as mass measles vaccination campaigns should be tailored to specific populations to ensure coverage of all children aged 12 to 15 years as the first priority. To prevent unnecessary deaths, the humanitarian response to famine needs to be rapid, well-coordinated, and based on sound epidemiological evidence. In order to achieve greater success in measles control, direct political and financial commitment by governments and global health partners is crucial. Looking to the future, sustained control will require a broader focus on developing policies that address socioeconomic determinants of health; the individual, community, and population level conditions that increase vulnerability to disease [4].

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