

Routine immunization in Ethiopia

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Abstract

Background: Ethiopia is a large, low-income country in the Horn of Africa with the challenge of providing equitable health services across a highly dispersed population. The country's health system is decentralised, with authority devolved to the Regional Health Bureaus, Zonal Health Departments and Woreda Health Offices. Immunisation is one of the earliest forms of introduction of modern medicine in Ethiopia; smallpox vaccination was introduced in the mid-1800s and childhood immunisation started in the late 1940s before a major immunisation drive was conducted for smallpox eradication.

The Ethiopian Expanded Program on Immunisation (EPI) was launched in 1980, with six antigens namely BCG, Diphtheria, pertussis, tetanus, polio and measles. From 1980 up to 2003, the country's vaccination coverage has been rather low and erratic, reflecting major socio-political events such as government transitions and the Ethiopia-Eritrea war. However, coverage has shown gradual increments with the introduction of the Reach Every District (RED) approach in 2004 and the health extension program in 2003. Hepatitis B and Haemophilus influenza type B vaccines were introduced to the routine immunisation programme in 2007.

Methods: This is a review of the routine immunization performance in Ethiopia based on official documents and reports from the health sector.

Results: The annual routine immunisation plan is prepared based on the Comprehensive Multi-Year Plan which is developed every 5 years. The EPI has been strengthened in recent years and has involved rehabilitation and enhancing of cold chain capacity, as well as scaling up health extension program in rural areas. Pneumococcal-10 and rotavirus vaccines were introduced in 2011 and 2013 respectively. The Ethiopian EPI now offers a very comprehensive vaccination schedule. But despite good progress, there remain important discrepancies between different sources of data at regional level in vaccination coverage rates, notably in nomadic and remote populations.

Conclusion and Recommendations: The overall cost of the EPI has now increased significantly and is largely financed by external donors, notably GAVI, which raises longer term sustainability issues. [*Ethiop. J. Health Dev.* 2015; Special Issue 1:02-07]

Introduction

Ethiopia is a large, low-income country in the Horn of Africa that faces the challenge of providing equitable health services across a highly dispersed population. As of 2013, the country is home to 86 million people (1) living across 1.1 million square kilometres of diverse topography. The average household size is 4.8 and about 83% of the total population is rural, making Ethiopia one of the least urbanised countries in the world (2). Child mortality rate (deaths < 5 years old per 1000 births) was 68/1000 in 2012, dropping by a third in seven years and allowing the country to be on track

to achieve its Millennium Development Goal (MDG) on reducing child mortality (3). In 2014 the birth cohort was 3,142,343 and the number of surviving infants targeted by the Expanded Programme on Immunisation (EPI) was 2,994,182, making it one of the largest cohorts in Africa.

In Ethiopia, vaccine preventable diseases account for a substantial portion of under-five mortality. Pneumonia, diarrhoeal disease and measles are among the leading causes of under-five mortality (Table 1) (4).

Table 1: Annual preventable Under-5 Deaths in Ethiopia

Condition	% Attributable Mortality	Attributable Deaths	% Preventable Deaths	Preventable Deaths
Pneumonia	28	132,160	65	85,904
Neonatal conditions	25	118,000	55	64,900
Malaria	20	94,400	91	84,904
Diarrhoea	20	94,400	88	83,072
Measles	4	18,800	100	18,800
AIDS	1	4,720	48	2,266
Other	2	9,440	0	0
Total	100	472,000	72	340,806

Source: MOH. National strategy for child survival in Ethiopia, Federal Ministry of Health. 2005, Addis Ababa

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The country's health system is decentralised, with authority devolved to the Regional Health Bureaus (9 regions plus 2 city administrations), 103 Zonal Health Departments and 836 Woreda Health offices. Kebeles (the lowest administrative units) access primary health care services through 3,200 health centres and over 16,108 health posts. Accordingly, the Ministry of Health calculates that public health care coverage had reached 93% in 2010(5). Health posts implement the health extension program (HEP), an innovative, community-centred approach promoted by the government since 2003.

Expanding the basic health care service through HEP was accepted as the preferred and cost effective means to reach the rural communities. Consequently, the health extension program is organised and structured with one health post (HP) for an average of five thousand people in each Kebele with the aim of providing community based preventive health services (6).

HEP involves deployment at each Kebele of two female health extension workers (HEW) who are government employees and receive one-year pre-service training. In 2009 a total of 33,819 HEWs were trained and deployed, reaching 102.4 percent of the 33,033 HEWs target set out in the Health Sector Development Plan III (7).

The health extension workers are tasked with implementing the immunisation programme in their respective Kebeles. As a result, the health extension programme provides a valuable opportunity for enhanced access to immunisation services at community level. It institutionalises the Expanded Programme on Immunisation in the "village" health care delivery system and reduces opportunity cost for families, thus enhancing participation and creating demand (6).

Expanded Program on Immunisation (EPI) in Ethiopia:

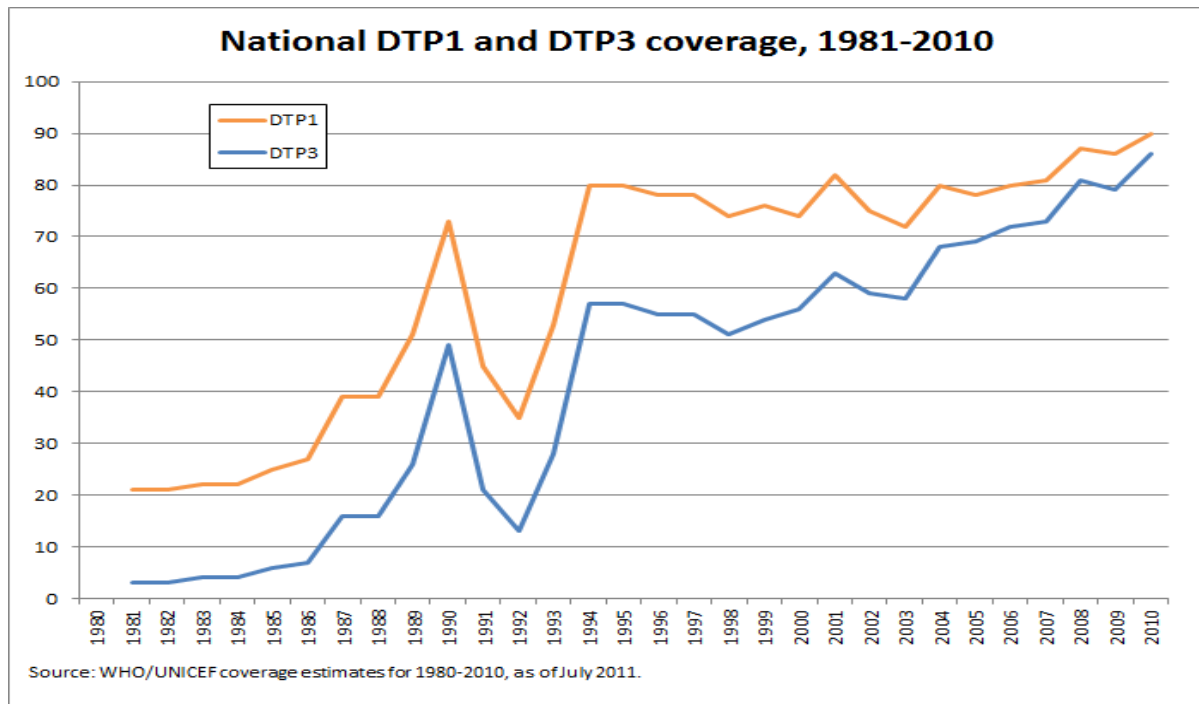
Immunisation is one of the earliest interventions of modern medicine in Ethiopia, with smallpox

vaccination introduced in the mid-1800s. Child immunisation was started in the late 1940s (8) and a major immunisation drive was conducted for smallpox eradication which was completed in 1977 (9). The Ethiopian EPI program was launched in 1980, with six antigens namely BCG, Diphtheria, pertussis, tetanus, polio and measles, with the goal of achieving 100% vaccination coverage for all children under two years of age by 1990. However, in 1986 the coverage target was revised to 75% and the target age group was changed to infants less than one year of age (10).

Hepatitis B and Hib vaccines were successfully added to the standard EPI schedule in 2007 through the introduction of pentavalent vaccine with support from GAVI. More recently, GAVI has supported Ethiopia to add pneumococcal and rotavirus vaccines to its immunisation schedule. Pneumococcal (PCV10) and rotavirus vaccines were introduced in 2011 and 2013 respectively in an effort to reduce child deaths due to pneumonia and diarrhoea, the most common causes of death for children under five both in Ethiopia and globally. Women of reproductive age (15-49 years) and pregnant mothers receive tetanus toxoid (TT) vaccine and there is a plan to introduced Td vaccine to school children.

Routine Immunisation Performance:

The immunisation coverage was 3% in 1980 and reached 49% in 1990. It then declined to around 20% in 1991 and 1992 due to security and other problems related to the change in government. Overall, from 1980 up to 2003, the country's vaccination coverage has been rather erratic, reflecting major socio-political events such as government transitions and the Ethiopian-Eritrean war which were associated with a limited operational budget for outreach and in-service training, a lack of community participation in the management of the service, and poor monitoring systems (11). However, the coverage has shown gradual increments since 2004 with the introduction of the Reach Every District (RED) approach in 2004 and the health extension programme in 2003 (Fig 1).

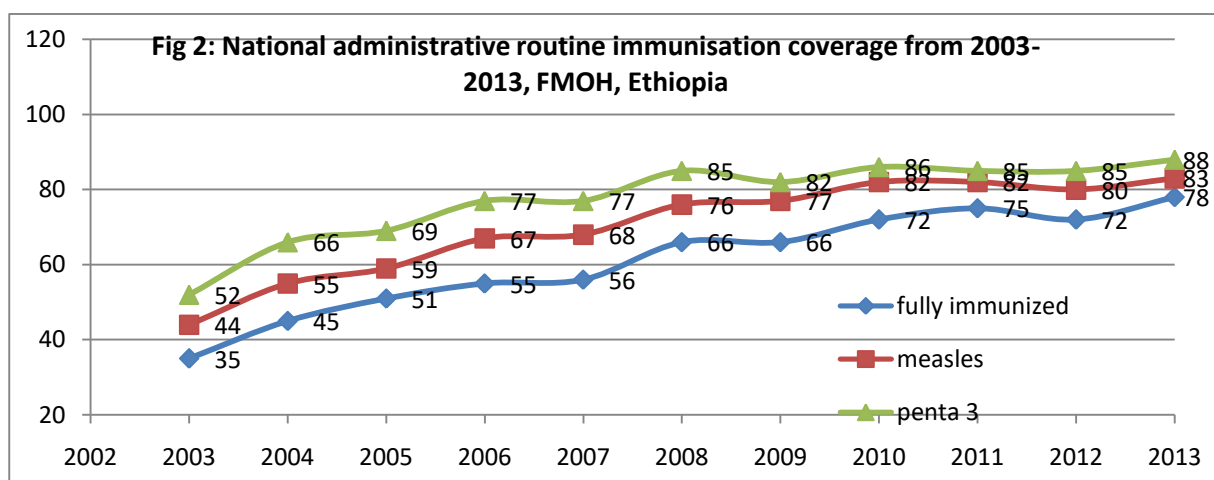


PEI - Polio Eradication Initiative, HEP-Health Extension Programme, EOS-Enhanced Outreach session, RED-Reaching Every District

The Health Extension Programme (HEP) provides a framework for advancing primary health care to community level. However, systemic barriers to improved coverage remain, despite more equitable geographical coverage and the construction and staffing of 15,000 additional health posts where two health extension workers are assigned.

The administrative coverage reported by the government differs from Demographic Health Surveys (DHS) and cluster coverage survey reports. According to the 2005 and 2011 DHS reports, Penta 3 vaccination

coverage was 34% and 37% respectively (12, 13) while a national immunisation coverage survey showed a coverage of 66.0% and 65.7% in 2006 and 2012 respectively (14, 15). Comparatively, the administrative coverage for the same years 2005, 2006, 2010 and 2012 were much higher at 69%, 77%, 86% and 85% respectively (Fig.2) due essentially to over/double counting and overall weakness of the health information system (8, 16). If we consider the administrative coverage, it shows a rapid improvement from 2003 to 2010 and stagnation afterwards until 2012.



Source: Federal Ministry of Health, 2014.

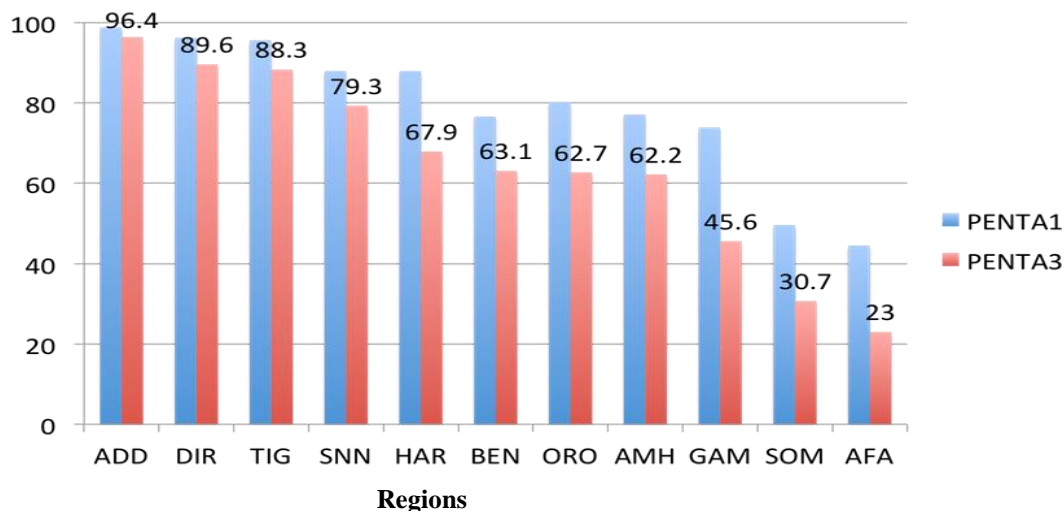
Regional Performance:

Due to its large size and population, the country still has a large number of unvaccinated children and there are huge variations in immunisation coverage among regions. Due to the topographic and climatic situation as well as limited capacity of the EPI, the performance of pastoralist regions has been low. The national routine EPI coverage survey conducted in 2012 showed that the penta 3 coverage of pastoralist regions notably Somali, Afar and Gambella were 30.7%, 23% and

45.6% as compared to the national coverage of 65.7% (15) (Fig 3).

The communities settling along the large international border areas are mostly pastoralists and semi-pastoralists and it is well recognised in administrative reports and various surveys that immunisation coverage of those areas is very low. Since populations across borders are of the same ethnic group, these tend to move freely and frequently between Ethiopia and other countries, resulting children are not being vaccinated on time.

Figure 3: Routine immunisation coverage by region, 2012 Ethiopia



(Source: 2012 national routine immunisation coverage survey)

ADD- Addis Ababa, DIR - Dire Dawa, TIG -Tigray, SNNP - South Nations Nationalities and Peoples, HAR - Harari, BEN - Benishangul-Gumuz, ORO - Oromia, AMH -Amhara, GAM - Gambella, SOM - Somali, AFA - Afar)

In addition, other barriers to vaccination such as shortage of vaccine supplies, non-functionality of refrigerators, lack of training and unavailability of health posts to deliver services still remain (17). Another major barrier reported is the low awareness of mothers and caregivers about the importance of immunisation, which made them reluctant to bring their children for vaccination (18). More generally, poor infrastructure and difficult topography, inequitable access and poor quality of services in these areas have not been well addressed.

Enhanced Routine Immunisation Activities (ERIA):

To address low immunisation coverage in pastoralist regions, Ethiopia implemented the Enhanced Routine Immunisation Activity (ERIA) strategy in all pastoralist regions and zones with large numbers of unvaccinated children from 2010 to 2011. The main objective of the strategy was to reach every child through registering and vaccinating all infants under one in every Kebele using outreach sessions.

The ERIA approach proved effective in increasing coverage particularly in pastoralist regions (19). However, the tendency of ERIA implementing regions of waiting for periodic ERIA instead of conducting routine EPI service regularly led the Ministry of Health (MoH) to reconsider the strategy and look for an alternative approach.

Governance:

The EPI in Ethiopia is developed by the MoH in close cooperation with WHO, UNICEF and other partners while implementation in each region is the responsibility of Regional Health Bureaus. With decentralisation that began in 1994, line ministries no longer exert direct control on sectoral activities at operational level including immunisation services. Regional Health Bureaus are accountable to their Regional Councils and Woreda Health Offices to Woreda Councils. Decentralisation from regional to Woreda level was initiated in 2002 with Woredas formulating their own priorities for allocating available funds to all sectors. In the process, the amounts allocated to the health sector, for drugs and operational costs in particular, fluctuate and remain generally inadequate (20).

A National Inter-Agency Coordinating Committee (ICC) was established in 1996, as an advisory body to the Ministry of Health, to mobilise financial support, ensure effective technical co-ordination, as well as efficient use and greater impact of technical, material and financial resources. The ICC is chaired by two State Ministers and has members from partner organisations working on EPI (21) while technical sub-committee of the ICC are responsible for technical and operational issues.

Planning:

Annual routine immunisation, which is guided by the Comprehensive Multi-Year Plan, is planned on a yearly basis as part of the child health programme. The comprehensive EPI Multi-year plan, developed every 5 years, is integrated and aligned with the Health Sector Development Program (HSDP) of the FMOH (22).

Surveillance:

Case based surveillance of Vaccine Preventable Diseases (VPD) is part of the Integrated Diseases Surveillance and Response (IDSR) system which has been reinforced by the robust surveillance system developed for the polio eradication initiative and measles elimination programme. VPD are included in the 19 diseases and conditions (i.e. including malnutrition) in the new Public Health Emergency and Surveillance (PHES) system. More specifically, neonatal tetanus, measles and polio are among the few immediately reportable diseases. Various Surveillance Guidelines have also been developed (23). Rotavirus diarrhoea surveillance sites have been established in Black Lion, Yekatit12 and Betezata Hospitals.

Cold Chain and Logistics:

Despite progress, previous cold chain evaluations undertaken indicate a lack of adequate functioning cold chain equipment such as refrigerators; weak cold chain equipment maintenance capacity at lower administrative levels; and a lack of continuous supply of consumables (kerosene) and spare parts (24).

To address these issues, the MOH in collaboration with partners such as GAVI, UNICEF and WHO has implemented specific interventions to enhance the cold chain status of the country. These included, among others, the cold chain rehabilitation plan that was developed in 2003; national cold chain inventories (2008 and 2013); regular cascade training for cold chain technicians implemented from 2008 to 2011; and the new 75/25% kerosene budget sharing by the MOH (75%) with Regional Health Bureaus (25%). The interventions have contributed significantly to identifying the gaps and strengthening the storage and cold chain management capacity of the country (25).

Financing of Immunisation Program:

Ethiopia is heavily reliant on a large number of partners' funding for financing its immunisation programme. Donor funds cover vaccines cost, training, supervision, monitoring, a share of capital costs, and supplementary immunisation activities. The government has secured a budget line for EPI that funds the cost of some traditional routine vaccines such as BCG, TT and 50% of polio vaccines as well as country co-financing of the newly introduced vaccines (PCV and rotavirus vaccines). Salary of healthcare workers providing immunisation and other services and a limited capital budget is financed by the Ethiopian government. The main funding partners for immunisation include the GAVI Alliance, UNICEF, USAID, Netherlands and the government of Japan (26). The contribution from GAVI is especially substantial, making Ethiopia the biggest recipient

country of GAVI funds in Africa since the establishment of the organisation in 2001, with over \$723 million committed over the period 2001-2019 (26).

Although the introduction of pneumococcal and rotavirus vaccines is expected to have a significant impact on under-five mortality, new vaccine introductions have an immediate effect on the overall budget for immunisation (initial cost of the new vaccine introduction, recurrent country co-financing, vaccine administration operation). Ultimately the cost of the newly introduced vaccines will be a challenge when GAVI support is terminated. To this effect Ethiopia has developed a Financial Sustainability Plan (FSP) with the ultimate goal of ensuring "self-sufficiency" i.e. cover all costs related to immunisation, including the purchase of vaccines and required logistics, personnel and operational costs (23).

However, for a country like Ethiopia, where overall health expenditure is still low, the realisation of the FSP will imply a sustainable mobilisation and efficient use of domestic and external resources. The strategy for the financial sustainability plan has been based on identifying key activities for sustainable financing, which include 1) mobilising additional resources from central and local governments, the private sector, civil society and NGOs and from funding agencies; 2) increasing reliability of resources from both governmental and external sources; 3) improving programme efficiency by minimising vaccine wastage, improving EPI programme management and maximum use of the health extension programme (27).

Conclusion:

Vaccination coverage rates in Ethiopia have experienced very significant progress in past decades, owing to the strengthening of the programme itself and the scale up of national policy to improve access to primary health care. With the more recent introductions of pneumococcal and rotavirus vaccines, the Ethiopian EPI offers a very comprehensive vaccination schedule which is expected to positively impact on child health outcomes. Despite good progress of vaccination coverage however, there remain important discrepancies at regional level, notably in pastoralist and remote populations. There are questions about how to address these weaknesses best. The Ethiopian EPI itself has been strengthened by the accelerated development of the HEP, comprehensive cold chain rehabilitation and modernisation, the introduction of several new vaccines and staff training. The overall cost of the EPI has increased substantially and it remains in large part financed by external donors, notably GAVI, which contributes to raising long term sustainability concerns.

Recommendations:

As a decades old public health program comprising traditional and ever increasing new and lifesaving vaccines with significant impact on infant and under five mortality immunization program in Ethiopia

deserves due consideration for improvement from the government as well as partner organizations.

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