

Strategy to Increase Access to Treatment of Childhood Diarrhea, Malaria and Pneumonia in Ethiopia

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Acronyms

ACTs	Artemisinin-based Combination therapy
AMA:	Anti-malaria Association
ARI:	Acute Respiratory Infection
BCC:	Behavioral Change Communication
EDHS:	Ethiopian Demographic and Health Survey
FMHACA:	Food, Medicine and Healthcare Administration and Control Authority
FMOH:	Federal Ministry of Health
GDP:	Gross Domestic Product
GMP:	Good Manufacturing Practices
HESP:	Health Extension Service Program
HEWs:	Health Extension Workers
HSDP:	Health Sector Development Program
HSEP:	Health Sector Extension Program
ICCM:	Integrated Community Case Management
IEC:	Information, Education and Communication
IMCI:	Integrated Management of Childhood Illness
IMNCI:	Integrated Management of Neonatal and Childhood Illnesses
IRS:	Indoor Residual Spraying
ITNs	Insecticide Treated Nets
LLIN:	Long Lasting Insecticidal Net
LMIS:	Logistics Management and Information System
M&E:	Monitoring and Evaluation
MDG:	Millennium Development Goal
MSH:	Management Sciences for Health
NGOs:	Non-governmental Organizations
NHAs:	National Health Accounts
NHE:	National Health Expenditure
ORS:	Oral Rehydration Solution
PFSA:	Pharmaceutical Fund and Supply Agency
PHCU:	Primary Healthcare Unit
PMI:	President's Malaria Initiative
PPP:	Public Private Partnership
PSI:	Population Service International
RDT:	Rapid Diagnostic Tests
RHB:	Regional Health Bureau
SC4CCM:	Supply Chain for Community Case Management

SCM:	Supply Chain Management
SNNP:	Southern Nations, Nationalities, and People's Region
SSA:	Sub-Saharan African
STG:	Standard Treatment Guideline
UNICEF:	United Nations Children's Fund
VCHWs	Voluntary Community Health Workers
WHO:	World Health Organization
WoHOs:	Woreda Health Offices

Executive Summary

The Government of Ethiopia (GoE) has been working to extend primary healthcare services across the country. Since 1998, it has been implementing the Health Sector Development Program (HSDP) which outlines long term plans for the sector and the means to attain them by way of a series of phased, medium term plans to be implemented in 4 phases of 5 years each. During HSDP II, the Health Extension Service Program (HESP) was launched to provide a package of essential health services focusing on preventive health measures. It is a community-based intervention program with a package of basic preventive, promotional, and selective curative services for common illnesses such as diarrhea, malaria and pneumonia, and is considered a key program for achieving the health-related millennium development goals (MDGs).

Through the support of UNICEF and other partners, the GoE has been working to strengthen the integrated community case management (ICCM) of diarrhea, malaria and pneumonia. The main objective of the program is to engage families and communities to join health extension workers (HEWs) in the effort to improve health at the personal and local levels and contribute to the achievement of MDG 4 target.

Recent reports (Ethiopian DHS 2011) indicate that an encouraging performance with regard to early childhood mortality rates has been achieved. Neonatal mortality, infant mortality and under-5 mortality stand at 37, 59 and 88, respectively as compared 46, 95, and 166 deaths, respectively per 1,000 live births in 1990. Ethiopia was however categorized in the Child Mortality Report 2011, as demonstrating 'insufficient progress' as its under-five mortality was more than 40 deaths per 1,000 live births in 2010 and the average annual rate of reduction was at least 1% but less than 4% over 1990–2010. This calls for accelerated interventions if Ethiopia is to meet the MDG4 by 2015.

This document presents analysis of major bottlenecks to treatment of the major childhood killers, diarrhea, malaria and pneumonia and forward major areas of targeted interventions including:

- a) Co-packaging and/or co-marketing of zinc and ORS
- b) Changing the status of zinc from requiring prescription to over the counter (OTC).
- c) Strengthening IEC/ BCC programs to improve care-seeking behavior and rational use of medicines
- d) Strengthening the supply chain system
- e) Enhancing the role of the private sector and fostering public private partnerships.
- f) Increasing coverage of IMNCI/ICCM program in pastoralist regions and private health facilities.
- g) Strengthening the monitoring and evaluation system of the sector.

In summary, the GoE and its development partners are committed to scaling-up effective treatment of childhood diarrhea, malaria and pneumonia to meet the MDG4 by 2015. In an effort to complement these plans/programs and help the government achieve the MDG-4 target, [UNICEF](#) and Management Sciences for Health ([MSH](#)) initiated the preparation of a country strategy to increase access to treatments for childhood diarrhea, pneumonia and malaria. The purpose of this document is to present an analysis of major bottlenecks to treatment of these major childhood killers and forward major areas of targeted interventions.

1. Introduction

A decade has passed since the Millennium Declaration and the subsequent Millennium Development Goal (MDG) framework was developed with goals and targets to significantly reduce extreme poverty, hunger, illiteracy and disease. Among the 8 MDGs, MDG 4 is concerned with reducing child mortality. Specifically, the target is to reduce the under-5 mortality by two thirds between 1990 and 2015. The indicators for monitoring progress are the under-5 mortality rate, the infant mortality rate and the proportion of 1 year-old children immunized against measles¹. The latest report on MDG 4 acknowledges the accelerated rate of decline in child mortality which nonetheless remains insufficient to reach the set goal.² This project focusses the bottlenecks to the prevention and treatment aspects of the major childhood killer diseases: diarrhea, pneumonia and malaria.

Globally, there has been a decline of 35% in mortality rate for children under-5 from 88 deaths per 1,000 live births in 1990 to 57 in 2010. This translates to the decline in the number of deaths in these children from 12 million in 1990 to 7.6 million in 2010, which would be nearly 12,000 fewer children dying each day.³ As is the case with other sub-Saharan African (SSA) countries, an encouraging performance with regard to early childhood mortality rates is reported by the Ethiopian government.⁴ Since 1990, Ethiopia's rates for neonatal, infant and under-5 mortality has decreased by 19%, 37% and 46%, respectively (CSA and ICF Macro, 2005, 2011). The latest data from the Ethiopian Demographic and Health Survey (EDHS) shows that the under-5 child mortality rate is 88 per 1,000 live births. While this progress is extremely encouraging, it is still insufficient in order to meet the MDG 4 target which aims to reduce under-5 mortality to 67 per 1,000 live births in the country (UNICEF, 2011).¹⁰

Ethiopia has the third highest population in Africa and is one of the least developed countries, exhibiting low development and health indicators. Forty-four percent of the population lives below the national poverty line and 82% lives under a dollar a day. In an effort to meet the needs of its population, Ethiopia has been enhancing the national health delivery infrastructure since 1996/97. In 2002, the overall number of health facilities has increased by 55%, however, mostly due to growth in the private sector.⁵

The Ethiopian government has been working to extend primary healthcare services to the population with their full participation. This has been expressed from the outset with the launch of the National Health Policy which had the primary objective of providing comprehensive and integrated primary healthcare in health institutions at the community level.⁶ Since 1998, the government has been implementing the Health Sector Development

¹UN (2008), Official list of MDG indicators

² UN (2011), The Millennium Development Goals Report 2011. Addendum (Goal 4)

³UNICEF, WHO, World Bank, UN Population Division (2011). Levels and Trends in Child Mortality Report 2011.

⁴ CSA and ICF Macro (2011), Ethiopia Demographic and Health Survey 2011 – Preliminary Report

⁵ Wamai, R. (2009), Reviewing Ethiopia's Health System Development. JMAJ 52(4): 279–286,

⁶FMOH (1993), Health policy of the Transitional Government of Ethiopia

Program (HSDP) which set long term plans for the sector and the means to attain them by way of a series of phased, medium term plans to be implemented in 4 phases of 5 years each. During HSDP II, Health Extension Service Program (HESP) was launched to provide a package of essential health services focusing on preventive health measures targeting households, particularly women/mothers at the *kebele* (lowest administrative) level. HESP is considered as a key program for achieving the health-related MDGs⁷, specifically those related to child health.

In an effort to complement these plans and programs and help the government achieve the MDG-4 target, UNICEF and Management Sciences for Health (MSH) initiated an analysis of the current factors affecting access to treatments for childhood diarrhea, pneumonia and malaria, in preparation for the development of a national strategy to address potential barriers to access. In addition to conducting an extensive literature review, interviews were conducted with various stakeholders representing both the public and private health sectors such as Directorates in the Federal Ministry of Health, Regional Health Bureaus, Food, Medicine, & Health Care Administration and Control Authority, and health facilities as well as key International Organizations such as UNICEF, WHO and various partner organizations and NGOs. Public and Private importers and distributor (Pharmaceutical Fund and Supply Agency), local pharmaceutical factories, and drug Retail Outlets such as pharmacies and public/private drug stores. The purpose of this document is to present an analysis of major bottlenecks to treatment of these major childhood killers and forward major areas of targeted interventions.

2. Analysis and Strategic Context

2.1. Epidemiology of major childhood diseases

According to the latest data from the Ethiopian Demographic and Health Survey (EDHS), encouraging performance with regard to early childhood mortality rates has been achieved. Rates for neonatal mortality, infant mortality and under-5 mortality stand at 37, 59 and 88, respectively. The figures at baseline in 1990 for neonatal, infant mortality and under-five mortality were 46, 95, and 166 deaths, respectively per 1,000 live births. Ethiopia has decreased neonatal, infant mortality and under-five mortality rates from the 1990 baseline by 19%, 37% and 46%, respectively and has made significant progress in reducing under-5 mortality rate.^{8,9} Ethiopia was however categorized in the Child Mortality Report 2011, as demonstrating 'insufficient progress' towards MDG 4 as its under-five mortality was more than 40 deaths per 1,000 live births in 2010 and the average annual rate of reduction was at least 1 percent but less than 4 percent over 1990–2010.¹⁰

⁷ FMOH (2005), Health Sector Development Plan (HSDP-III) 2005/6-2009/10.

⁸ CSA and ICF Macro (2006), Ethiopia Demographic and Health Survey 2005 – Final Report

⁹ CSA and ICF Macro (2011), Ethiopia Demographic and Health Survey 2011 – Preliminary Report

¹⁰ UNICEF, WHO, World Bank, UN Population Division (2011). Levels and Trends in Child Mortality Report 2011

In 2010, among the top ten causes of death among children under-5 are diarrhea, malaria and pneumonia. Moreover, pneumonia was the leading under-5 childhood killer being responsible for 18% of all mortality in the same year. Diarrhea and malaria in turn were responsible for 8% and 3% respectively of all under-5 mortality. Also, pneumonia (15%), diarrhea (13%) and malaria (15%) were the leading causes of morbidity amongst children under-5 years.³⁰

Segmenting the EDHS data for under-5 mortality found significant variations between regions with some regions reportedly performing better. The City Administration of Dire Dawa and Somali Region reported 72 and 93 deaths per 1,000 live births, while other regions such as Benishangul-Gumuz and Amhara regions reported 157 and 154, respectively. This disaggregated data gives a picture of how a region such as Addis Ababa which seemingly has the highest concentration of public and private health facilities including the highest referral hospitals, could perform relatively poor with respect to under-5 childhood mortality. It is indicative of the need to expand the coverage of primary healthcare. It also indicates that while a region such as Somali may seem to be doing relatively well, upon further analysis of health data it is in fact relatively behind in terms of general healthcare services and childhood health services in particular.¹¹

According to the last Demographic and Health Survey for Ethiopia, overall 7% of children under 5 had experienced symptoms of ARI (considered a proxy for pneumonia), 17% exhibited fever, and 13% experienced diarrhea in the 2 weeks preceding the survey. Of those with the symptoms, treatment from a health facility or provider was sought for 27%, 24% and 31% of children with ARI, fever and diarrhea symptoms, respectively. Among those children that sought treatment, 31% of children with diarrhea reportedly received a rehydration solution from an ORS sachet or a recommended home fluid. The findings from the EDHS also indicate that children of urban mothers were more likely than those of rural mothers to receive treatment from a health facility or health provider when sick with symptoms of ARI, fever or diarrhea. Accordingly, 46.9%, 37.8% and 53.5% of urban mothers as compared to 25.0%, 22.4% and 28.8% of rural mothers, respectively sought treatment for symptoms of ARI, fever and diarrhea.¹²

The findings of the EDHS are indicative of the low service utilization by mothers for their sick children. While the reasons for this could be many, it is clear that unless the figures for the proportion seeking treatment increases, reducing childhood mortality especially as per the commitments of the MDGs will not materialize. The key stakeholders believe that MDG 4 can be achieved provided that the activities on childhood mortality reduction are accelerated. This would require wide-spread scale up of high quality treatment for diarrhea, pneumonia, and malaria and increased utilization by mothers of health facilities and services. In order to rapidly expand access and coverage of health services, Health Extension Workers (HEWs) have been trained and deployed to the *kebeles* (lowest administration level) to deliver “promotive, preventive, and selected curative health care services”, focusing on mothers and children.¹³

¹¹ FMOH (2010), Health and health related indicators, 2002 EFY

¹² CSA and ICF Macro (2011), Ethiopia Demographic and Health Survey 2011 – Preliminary Report

¹³ FMOH (2007), Health Extension Program in Ethiopia- Profile.

These strategies are in line with the integrated management of childhood illness (IMCI) approach of the WHO and UNICEF that has been promoted as a simple and effective method to prevent and manage the leading causes of under-five children illnesses in a holistic manner in primary healthcare settings. The IMCI guidelines promote evidence-based assessment and treatment using a syndromic approach that supports the ‘rational, effective and affordable use of drugs’.¹⁴

2.2. Health System Overview

2.2.1. Health care delivery system

The 1994 Ethiopian Constitution created a Federal Government Structure which is composed of nine Regional States and two City Administrations. The National Regional States and City Administrations are further divided into 870 woredas. Woreda is the basic decentralized administrative unit. The 611 woredas are further divided into roughly 15,000 Kebeles organized under peasant associations in rural areas (10,000 Kebeles) and urban dwellers associations (5,000 Kebeles) in towns.

Similarly, the health sector of Ethiopia follows a decentralized system. The overall responsibility for the country’s health policy rests on the FMOH, while responsibility for the management of health services delivery falls with the respective regional health bureaus (RHBs) and City Administrations. Administratively, the Woreda Health Office (WoHO) is the basic unit which is accountable to Zonal Health Department (ZHD) which in turn is answerable to RHB.

Ethiopia has a three-tier healthcare delivery system which is characterized by a first level of a Woreda health system comprising a primary hospital (with population coverage of about 100,000 people), health center (1 for about 25,000 people) and their satellite health posts (1 for about 5,000 people) that are connected to each other by a referral system. A primary hospital, health center (HC) and health posts (HPs) form the primary health care unit (PHCU) with each HC having five satellite HPs. The second level in the tier is a general hospital with population coverage of about 1.5 million people; and the third a specialized hospital that covers about 5 million people¹⁵

The HP provides preventive and promotional health services with basic prevention based treatment and it is the center of the health extension package. The HC provides comprehensive primary health care services. It receives referrals from the HPs. It also offers technical backup to HPs. The primary hospital provides basic curative health services mainly focusing on emergency obstetric care services, while general and referral hospitals provide secondary and tertiary health care services. The higher levels of health facilities mentor the lower levels, for example the general hospital mentors the HC, and the later in turn mentors the HPs. Integrated supportive supervision is conducted by the WoHOs.¹

¹⁴ WHO/UNICEF (2005), Handbook: Integrated Management of Childhood Illness

¹⁵ FMOH (2010), Guideline for Implementation of a Patient Referral System

The health extension program (HEP) has radically changed the landscape of the community health service delivery system in Ethiopia. After the introduction of HEP, many families and communities are empowered to take care of their own health through the model family training approach. HEWs are trained to assess and classify the four major killers, namely, diarrhea, malaria, pneumonia and malnutrition in under-five children.¹⁶

2.2.2. Health service coverage and utilization

According to the 2009/10 “Health and Health Related Indicators” of the FMOH, the public health facilities available in the country in 2008/09 were 14,192 HPs, 2,142 HCs and 129 hospitals (116 under FMOH and 13 hospitals run by other governmental organizations). In addition there were 14 hospitals run by NGOs.¹⁷ The health needs of the population cannot be addressed by the government alone and as a result there is a big gap between the public’s demand and service delivery. Healthcare utilization of the population is generally poor throughout the country with the per capita outpatient department (OPD) attendance in 2010 standing at 0.29 which is less than what it used to be five years back and significantly less than the HSDP III target (.66). Wide variations were also observed across regions. Figures for per capita visits were 0.11 and 0.13, respectively for regions such as Gambela and Somali and 0.68 and 0.53 for Addis Ababa and Tigray regions, respectively.¹⁸ With regard to the distribution of private health facilities such as clinics and hospitals, a similar trend can also be observed as with the public health facilities. Some regions such as Oromia, Amhara, Addis Ababa, SNNP and Tigray have between them more than 4,000 and 60 private clinics and hospitals, respectively. Others such as Afar, Benishangul-Gumuz, Somali and Gambela have 157 and 4 clinics and hospitals, respectively.

Of the total number of public health centers available in 2010, 1,267 (59.2%) health centers and 81 hospitals were providing IMNCI services. Furthermore, 578 districts/*woredas* were providing community IMNCI interventions. The number of health services providing IMNCI has been increasing since 2005, from 216 to 548 in 2008 and 930 in 2009. However this is much lower than the target set for 2,837 (90%) health centers to provide IMNCI services. Regional discrepancies also exist with relatively developed regions such as Amhara and Tigray providing the service in more than 70% of the health centers but less developed regions, such as Afar, Gambela and Somali providing IMNCI in less than 40% of facilities.¹⁵

One increasingly important sector filling this gap is the private for-profit health sector. In 2009/10 the private sector comprised of 4,229 clinics (including 2,930 lower, 877 medium, 264 higher and 158 special clinics) and 51 hospitals. Although most of these facilities may not be affordable for the larger population of the country the services they provide as well as their contribution in reducing patient overload in the public sector cannot be overemphasized.³

¹⁶ FMOH (2010), National Implementation Plan for Community Case Management of Common childhood Illnesses

¹⁷ Health and Health Related Indicators, FMOH 2010/11 (2002 EFY)

¹⁸FMOH (2010), Health and health related indicators, 2009/10

In an effort to expand the reach of health care services, the government launched the Health Sector Extension Program (HSEP) which has been in operation in both rural and urban settings since 2003 is considered to be the backbone of the healthcare system. The HSEP has led to increased coverage of publicly-funded health care from 61% in 2003 to 87% in 2007.¹⁹ It is a community-based intervention program with a package of basic preventive, promotive, and selective curative services for illnesses such as diarrhea, pneumonia and malaria.²⁰ The HSEP trains and assigns two HEWs to every *kebele* to deliver primary health care services to community and households. They are expected to spend 75% of their time in the field conducting outreach services by going from house to house and the remaining time at the health post.²¹ At the end of HSDP III (2009/10), 30,995 rural and 3,401 urban HEWs were trained and deployed.

According to a baseline assessment conducted by Supply Chain for Community Case Management (SC4CCM), ICCM products to be available at health posts throughout Ethiopia were not available adequately at the time to have the desired impact on child mortality. This has been attributed to the fact that the policy and guidelines for ICCM had only recently been adopted, in particular the guidelines for treating pneumonia. Besides drugs for pneumonia treatment, child health products for malaria and diarrhea such as cotrimoxazole pediatric tablets, ACTs (Artemisinin-based Combination therapies) and ORS (oral rehydration solution) were in much smaller supply than the products for family planning services at the time of the survey.²² Pharmaceuticals have been procured to provide HEWs with a starter kit to last each health post approximately six months and preparing of kits is underway. 500 kits are already distributed to Jimma and Western Hararge. A national quantification exercise for all of the products required for HEWs to implement the service packages covered in the ICCM training has been prepared by Pharmaceutical Fund and Supply Agency (PFSA) and partners in 2011 for the years 2012 to 2014. The quantification was done with active participation and input from members of PFSA, Federal Ministry of Health (FMOH), Regional Health Bureaus (RHBs), UNICEF and other NGOs supporting ICCM implementation and supply chain partners in Ethiopia. Moreover, there is a recent plan by PFSA and partners to introduce the new Health Post Resupply Program to 8,500 health posts, through 1,700 existing health centers, within the coming twelve months (up to September 2012).^{23,24}

2.2.3. Supply Chain

Until 2007, an organization called PHARMID operated in the country for over fifty years and was the only organization responsible for non-program drugs, and co-existed with the private sector

¹⁹ Wakabi, W. (2008). Extension workers drive Ethiopia's primary health care. *The Lancet*. 372:880

²⁰ Degefe, T. et al. (2009). Community case management improves use of treatment for childhood diarrhea, malaria and pneumonia in a remote district of Ethiopia. *Ethiop. J. Health Dev.* 23 (1):120-126.

²¹ Admassie et al (2009). Impact Evaluation of the Ethiopian Health Services Extension Program: A Non-experimental Approach. GDN Working Paper No. 22.

²² JSI/SC4CCM (2010), Improving Supply Chain for Community Case Management of Pneumonia and Other Common Childhood Illnesses. Baseline Assessment Preliminary Report

in supplying some of the pharmaceuticals needed throughout the country. In mid-2007, the **PFSA** was created with a larger mandate to supply the entire country with both program and essential drugs, as well as serve as the distribution entity for vaccines, other health facility supplies, and laboratory equipment. The end goal is for PFSA to be the sole distributor of health-related materials to all public facilities within the country. Under PHARMID the system was fully a “push” supply chain; today, under PFSA, the system is still largely “push”, but it is moving toward the “pull” model.^{25,26}

PFSA’s current supply chain starts from its central hub in Addis Ababa. PFSA distributes medicines, kits, supplies and medical equipment products to the various hubs (distribution centers) in the country and on to public hospitals, clinics, and **HCs**. PFSA, may also deliver the products to the health facilities directly with no profit, only adding a small percentage service charge.⁹ HPs receive their commodities through the HC with which they are associated, and/or woreda health offices (**WoHOs**). Ninety-five percent of **HEWs** collect their supplies most commonly by walking (71%) and sometimes using public transport (32%) or animal transport (9%) to travel to and from the resupply point. Many use multiple modes of transport.¹⁰

Continuous supply of drugs is essential for a successful implementation of the **ICCM** of common childhood illnesses. To roll out **ICCM** by HEWs, ORS and Zinc salts for diarrhea, Cotrimoxazole for pneumonia and Coartem and **RDT** for malaria need to be made available.² According to the **FMOH**, the ICCM supply and logistics strategy is divided into three time periods: immediate, medium-term and long-term. In the immediate term, the FMOH and partners will continue to provide the supplies to HEP through ongoing programs: Malaria, **HP** kit distribution, etc. Supplies which are not available at community level will be procured centrally, where UNICEF and other partners will assist in the procurement and distribution. In the medium-term, ICCM supplies will gradually be integrated in the harmonized logistics management information system (**LMIS**) which is being developed by SCMS/**PFSA**. Following the phased roll-out, supplies will be delivered directly from the PFSA hubs to the *woredas*. Requests of the HPs will be integrated with those of the HCs. The long-term goal is for all CCM commodities, including the supplies provided by partners or managed by regions or zones, to be channeled through PFSA. PFSA will procure based on the information generated by the harmonized **LMIS** and deliver from the hubs directly to the HCs. From the HCs, the supplies will either be collected by the HEWs and/or delivered at the HPs during supervisory visits.²

2.2.4. Healthcare financing

A good healthcare financing system raises adequate funds for health in ways that ensure that people can use needed services, and are protected from financial catastrophe or impoverishment associated with having to pay for them. In this regard there are a number of

²⁵ The World Bank (2009), Ethiopia-Improving health systems, Public sector healthcare supply chain strategic network analysis and design, Driving service improvements through supply chain excellence.

²⁶ USAID (2009), RPM+/SPS and SCMS in Ethiopia: An Evaluation; Hawkins, S., Gebre-Mariam, T. and Lassooy, E.

indicators that may show the commitment of a country in terms of allocating adequate budget and ensuring its sustainability. The situation in Ethiopia has been showing progress but the latest findings from the 4th National Health Accounts (NHA) study and the Health and Health Related Indicators data of the FMOH show major challenges.^{27,28}

Share of the health budget as a proportion of total budget for Ethiopia has grown from 9.1% to 10.4% between the years 2007/08 and 2009/10, respectively. The per capita allocation as well as expenditure on health has likewise increased in 2010 from the previous year.⁸ Per capita national health expenditure (NHE) also grew substantially, more than doubling from USD 7.14 per capita per annum in 2004/05 to USD 16.09 in 2007/08 according to the 4th NHA study. The study also disclosed that the total expenditure on health as percentage of GDP reached 4.5%, which was close to the WHO standard of 5%.²¹ This was however low compared with the Abuja Declaration of African countries, a commitment to raise the share of health expenditure to 15%.²⁹ The NHA in fact notes that health was still underfinanced and the strong need for making more resources available to the sector to improve the health status of the population.²¹ There is a general understanding by the Ethiopian government on the need to improve the level of public funding of the health sector as per the Abuja Declaration (allocating 15% of GDP for health sector funding).³⁰

During the period 2004/05 to 2007/08, although government contributions grew by 71%, most of the increment came from the households (176%) and from international partners and donors (143%). The Ethiopian health sector was pronounced to be highly donor financed and households heavily burdened by high spending on health that usually occurred at times of sickness. One recommendation that came out of the NHA study was the critical need to work on sustainability of health sector financing as well as on reducing the financing burden on households, particularly at time of sickness, through the introduction of prepayment mechanisms.³¹

The 4th NHA study revealed the private sector to be the major manager of health resources, although the government's contribution was significant. Accordingly, all private sector actors together managed 44% of NHE in 2007/08 (households taking up 87%), followed by the government including the FMOH and other federal agencies, RHBs and *woreda* (district) health offices (WoHOs) which controlled 42%. International partners, in addition to being major sources of finance, act as key financial agents, managing 14% of the total health expenditure. Overall, the 4th NHA study found that there is still considerable financial burden at the household level, households are the key health decision makers, and there is high potential for contribution by private health facilities in service delivery for the treatment of childhood

²⁷FMOH (2010), Ethiopia's Fourth National Health Accounts, 2007/2008

²⁸FMOH (2010), Health and health related indicators, 2002 EFY

²⁹UNECA and AU (2011), Information Note: 10 Years after the "Abuja Commitment" to Allocate 15% of National Budgets to Health.

³⁰HNP Discussion Paper (2009), Ethiopia: Improving Health Service Delivery

³¹FMOH (2010), Ethiopia's Fourth National Health Accounts, 2007/2008

diseases. These factors must be taken into account when trying to implement interventions towards bottlenecks in healthcare provision including childhood treatment.²⁵

2.3. IMCI and CCM

Although Ethiopia has witnessed a steady reduction in child mortality (more than 40%) across the country³²; over 300,000 children under the age of five still die each year from preventable or treatable conditions such as diarrhea, ARI primarily pneumonia, and malaria, which account for 22.8%, 15.2% and 6.8% of the total child mortality, respectively.³³ The other major killers are neonatal problems, (accounting for 37.8% of total mortality) and malnutrition.³⁴ A large proportion of deaths and illnesses attributed to these diseases can be prevented at the community level by the HEWs through preventive interventions and early, appropriate, low-cost treatment of sick children in the home or community, with ORS and zinc salts, anti-malarials and antibiotics. This community-based case management of common childhood illnesses approach is the most feasible way of scaling up the implementation of high impact child survival curative intervention in the foreseeable future.³⁵

The IMCI approach has been in use in Ethiopia since its adoption in 1997 as a major strategy to reduce childhood mortality. The recommended approaches for IMCI include methods for assessing signs and symptoms that indicate clinical condition, evaluating a child's nutrition, immunization and feeding, teaching parents how to care for a child at home; counseling parents to solve feeding problems; and advising parents about when to return to a health facility. The guidelines also include recommendations for checking the parents' understanding of the advice given and for showing them how to administer the first dose of treatment. The IMCI guidelines are action-oriented and lead the practitioners to classify the sick child if s/he should be urgently referred to another health facility, if the child can be treated at the first level facility with oral agents or if the child can be safely managed at home.⁷

Within the IMCI framework, acute respiratory infections (ARI), diarrhea, and malaria, are addressed, along with malnutrition, measles and other conditions that impact child mortality. Community IMCI activities have also been initiated in the nine regions. Since 2001, IMCI has been in its expansion phase and is progressing steadily. The National Child Survival Strategy document, which addresses the major causes of child morbidity and mortality, was also finalized and endorsed in 2004. The naming of IMCI has further been modified to be the 'Integrated Management of Neonatal and Childhood Illnesses (IMNCI) to better reflect the inclusion of neonatal health.³⁶

³² UNICEF (2008), Child survival, the status of the world children

³³ Black, E. R. (2010), Global, regional, and national causes of child mortality in 2008: a systematic analysis, *The Lancet*, 375 (9730), pp 1969 - 1987

³⁴ Ethiopia Demographic and Health Survey, 2011

³⁵ FMOH (2005), National Strategy for Child Survival in Ethiopia

³⁶ FMOH (2005), Health Sector Development Plan (HSDP-III) 2005/6-2009/10.

Due to low utilization of health care services, the Ethiopian government through the support of UNICEF and other partners has been working to strengthen the evidence and advocacy base for the integrated community case management (ICCM) of diarrhea, pneumonia and malaria. The main objective of the program is to engage families and communities to join health extension workers (HEWs) in the effort to improve health at the personal and local levels and contribute to the achievement of MDG 4 target. The ICCM program has also been shown to improve the treatment of diarrhea, pneumonia, and malaria.³⁷

The ICCM program, is being implemented in 112 districts of 12 zones in the big four regions of Ethiopia; Amhara, Tigray, Oromia, and SNNP³⁸ (Figure 1). According to FMOH and UNICEF, Benishangul Gumuz Regional State has recently been included in the program. Significant challenges however remain to scale up ICCM program. These include: assuring supportive supervision; maintaining quality of care for treatment services provided by HEWs; and strengthening supply chains to ensure availability of essential medicines and supplies at the point of care for HEWs.³⁹

As previously mentioned, pharmaceuticals have been procured to provide HEWs with a starter kit to last each HP approximately six months and preparing of kits is underway (Annex 1). Five hundred kits are already distributed to Jimma and Western Hararge. A national quantification exercise for all of the products required for HEWs to implement the service packages covered in the ICCM training has been prepared by Pharmaceutical Fund and Supply Agency (PFSA) and partners in 2011 for the years 2012 to 2014. The quantification was done with active participation and input from members of PFSA, FMOH, RHBS, UNICEF and other NGOs supporting ICCM implementation and supply chain partners in Ethiopia. Moreover, there is a recent plan by PFSA and partners to introduce the new HP Resupply Program to 8,500 HPs, through 1,700 existing HCs, within the coming twelve months (up to September 2012).^{40,41}

³⁷Degefe et al (2009). Community case management improves use of treatment for childhood diarrhea, malaria and pneumonia in a remote district of Ethiopia. *Ethiop. J. Health Dev.* 23:120-126

³⁸ JSI (2011), Ethiopia UNICEF Integrated Community Case Management of Common Childhood Illnesses

³⁹ UNICEF (2010), Thematic Report Young Child Survival and Development

⁴⁰ PFSA (2011), National Quantification Exercises Report for Integrated Community Case Management of Common Childhood Illnesses (ICCM) in Ethiopia, Products Requirements for 2012 to 2014

⁴¹USAID/DELIVER Project and JSI/SC4CCM (2011), Health Post Resupply Program Implementation in EFY2004: A proposed partnership between PFSA, the USAID | DELIVER PROJECT, and JSI/SC4CCM

The STG however does not mention zinc supplement for the management of diarrhea. In fact, zinc is not among the medicines listed for the treatment of diarrhea in the recently revised 'List of Essential Medicines for Ethiopia'.⁴³ Zinc products, i.e., zinc acetate, in the form of a 20mg dispersible tablet and zinc sulphate in the form of suspension and dispersible tablet (10 and 20mg) have recently been given market approval.⁴⁴ According to PFSA, zinc is currently included in the starter kits that will be provided to health posts for HEWs (Annex 2). However, zinc has still not been included in the kit given to HEWs during their initial training.(Annex 3).

It is only ORS that is included in the list of over-the-counter (OTC) products to be available in drug retail outlets; but zinc is currently defined as a prescription-only drug.⁴⁵ The average retail price of two sachets of ORS is USD 0.12- 0.18 (2 -3 ETB) and price of 10 cotrimoxazole tablets is USD 0.15- 0.59 (2.5 to 10 ETB) while price of 10 zinc tablets is USD 0.59 (10 ETB).

2.4.2. Malaria

The Ethiopian guideline for the diagnosis and treatment of malaria acknowledges that the most frequently used method for all peripheral areas where the majority of the malaria patients reside is based on clinical signs and symptoms. Since clinical diagnosis is unreliable as the signs and symptoms can overlap with those of other febrile diseases, The STG recommends the use of rapid diagnostic tests (RDTs) whenever possible and especially at health posts in order to make a more valid diagnosis to guide treatment decision and rational use of anti-malarial drugs. Microscopic diagnosis of malaria based on examination of blood films stained with Giemsa is accepted as the gold standard method of diagnosis and is recommended to be used at the health center and higher levels.

According to the current STG the following are recommended treatment approaches for different levels of care.^{46,47} For uncomplicated malaria and at the level of health post, artemether-lumefantrine (administered 2 times a day for 3 days) is the first-line drug for the treatment of all clinical malaria cases and for RDT confirmed falciparum malaria cases. For all RDT negative cases with clear clinical signs and symptoms of malaria, consider vivax malaria and treatment with 25 mg/kg should be started promptly and administered over three days. The patient should also be referred to the next higher level of health facility. Severe complicated malaria cases are referred to higher level care.⁴⁸

Anti-malarial drugs, including the expensive artemether-lumefantrine are available freely to patients coming to the public health facilities. The service including RDT at the health post level is also free. In the FY 2009/10, FMOH had procured 12 million doses of Coartem® to the regions.

⁴³FMHACA (2010), List of Essential Medicines for Ethiopia, 4th Ed.

⁴⁴ FMHACA (2011), List of Registered Drug Products

⁴⁵FMHACA (2010), List of Medicines for Ethiopia, 6th Ed.

⁴⁶ FMHACA (2010), Standard Treatment Guideline for Health Centers

⁴⁷ FMOH (2004), Malaria Diagnosis and Treatment Guidelines for Health Workers in Ethiopia

⁴⁸ FMOH (2010), IMNCI Chart Booklet for Health Extension Workers

A total of 11 million RDTs were planned for procurement and distribution to health posts, out of which 3.2 million were distributed and 8 million were under procurement as per the report released in 2010. FMOH also reported that an additional one million doses of Coartem®, 666,000 doses of chloroquine, 430,000 RDTs and 1.8 million LLINs (long lasting insecticide nets) have been provided to the SNNP region.⁴⁹ HEWs now have multi-species RDTs that can diagnosis both *P. falciparum* and *P. vivax*, They have also been supplied with chloroquine for the treatment of *P. vivax*).

In the drug retail outlets, anti-malarial drugs are available and have prescription only status except for prophylactic purposes. Among the drugs, Coartem® especially is expensive with a pediatric tablet pack containing 12 tablets costing USD 3.25 (56 ETB).

The drugs and related commodities for the public health facilities are primarily funded by the Global Fund which according to FMOH had disbursed USD 80,494,576 for the FY 2009/10.⁴⁰ The US government funded President's Malaria Initiative (PMI) has been a major contributor to the Global Fund support for malaria for three years since 2008.⁵⁰ PMI whose funding has been extended through 2014 by the US government is further involved in anti-malaria activities in Ethiopia.

Support by PMI to the malaria prevention and control activities in Ethiopia began in FY 2008. The focus area was the Oromia Regional State which is the largest of the nine regional states, covering a third of the country. Starting from FY 2011, PMI has plans to expand support to the remainder of the country while retaining the focus on Oromia. Since 2008, it has been procuring and distributing RDTs, ACTs and chloroquine. For the FY 2011, the PMI plans to procure and distribute 4.5 million ACT and 4 million chloroquine treatments, together with drugs for severe disease and pre-referral care. The amount for ACT and chloroquine for FY 2011 is more than the 3.5 million ACT and 2 million chloroquine treatments being procured with FY 2010 funds. PMI is also involved in supporting the review of national malaria diagnosis and treatment guidelines, strengthening the capacity to conduct quality assured diagnostic testing for malaria, supporting Ethiopia's drug regulatory body, FMHACA, in ensuring the quality of all imported anti-malaria drugs and related products and strengthening the national pharmaceutical management system, including the procurement, warehousing and delivery of malaria treatments. As part of the ongoing IEC/BCC efforts, PMI supports the Oromia RHB and its expanding system of HEWs to promote early care-seeking behavior and adherence to anti-malarial drug treatment.⁴¹

Malaria Consortium and Anti-Malaria Association (AMA), a major NGO working in malaria, works at both the national and at regional level in SNNP. At the national level it is mainly involved in the provision of technical assistance to the malaria control program. At the SNNP regional level it has been involved in IEC/BCC activities, training of health workers, developing logistics management information and standardized inventory control systems and conducting

⁴⁹ FMOH (2010), HSDP-III Annual Report for 2009/10

⁵⁰ PMI (2011), Malaria Operational Plan (MOP) Ethiopia

clinical audit to determine the status of quality of care delivered to patients, especially sick children with malaria.⁵¹ AMA operates primarily in the Amahara Regional State and has been involved in the area of IEC/BCC through public education programs and through deployment of volunteer health professionals who support the work of HEWs. It also donates anti-malarial drugs to the Amhara RHB when needed during epidemics.⁵²

2.4.3. Pneumonia

According to the current Ethiopian STG pneumonia is diagnosed when a coughing child also develops fast breathing but no signs for severe pneumonia. Severe pneumonia is diagnosed when there is cough or difficult breathing plus at least either of the following signs: lower chest in drawing, nasal flaring, or grunting in young infants. Fast breathing or abnormal breath sounds may also be present.⁵³ The guideline recommends diagnosis based on clinical judgment and chest x-ray, although the former is the most likely means especially in the primary healthcare settings.

For those cases classified as ‘pneumonia’, antimicrobial therapy is recommended of which cotrimoxazole and amoxicillin are recommended as the 1st line and alternative treatments, respectively. In case of ‘severe pneumonia’, benzyl penicillin is recommended as the starting agent after which, a switch to oral amoxicillin will be made once the child improves. The guideline also recommends to switch to parenteral chloramphenicol should the child not improve within 48 hours. The chloramphenicol is to be continued orally once the child improves.⁴⁴ All the recommended medicines for pneumonia are included in the essential medicines list and are in the list of registered products.^{54,55} However, dispersible amoxicillin tablet that is suitable for children is not available in the market. Besides, all the recommended medicines are registered as prescription only medicines. HEWs treat suspected case of pneumonia with cotrimoxazole 120 mg.

In the health posts, where majority of the children in the country seek treatment, cotrimoxazole 120mg is made available in the kit of HEWs for treatment of pneumonia.⁵⁶ Each health center has been receiving from PFSA on average 33 tins of 100 tabs x 120mg of cotrimoxazole that lasts for 6 months. HEWs in turn receive drugs from health centers. Although other formulations of cotrimoxazole are manufactured locally, this formulation is currently imported from abroad.

In towns, a significant proportion of under-fives seek treatment in the private sector for pneumonia. The costs of cotrimoxazole and amoxicillin in the private retail outlets range from

⁵¹ Malaria Consortium (2011), Activities on malaria prevention and control (<http://www.malariaconsortium.org/page.php?id=76>)

⁵² AMA (2011), Activities on malaria prevention and control (<http://www.amaethio.org/malaria.html>)

⁵³ FMHACA (2010), Standard Treatment Guideline for Health Centers

⁵⁴ FMHACA (2010), List of Essential Medicines for Ethiopia, 4th Ed

⁵⁵ FMHACA (2011), List of Registered Drug Products

⁵⁶ PFSA, (2011) Health Post Resupply Program Implementation in EFY2004: A proposed partnership between PFSA, the USAID | DELIVER PROJECT, and JSI/SC4CCM

USD 2 to USD 10 and USD 2 to USD 5, respectively. On the other hand, reports from private retail outlets and clinics show that expensive drugs like ceftriaxone were considered as the first line treatment of pneumonia. Many private drug retail outlets in towns also supply antibiotics for pneumonia without prescription. Apart from the unethical aspects of dispensing such drugs, majority of professionals in the private sector were not trained in IMNCI. According to the drug retail outlets, it is also a common practice to prescribe antibiotics for simple conditions such as cough and common cold.

At present, only two local factories manufacture drugs used for treating pneumonia in children. Cadila Pharmaceuticals Co. and Addis Pharmaceuticals PLC are manufacturing 2.8 million bottles and 1,763,000 bottles of Trimethoprim/sulphamethaxazole 200mg per 5 ml suspension of 100 ml per annum, respectively. With regards to Amoxicillin 125mg per 5 ml dry powder for oral suspension of 125ml, the former and the later companies produce 5.1 million bottles and 1,126,000 bottles, respectively.

Treatment costs have been reported to impact effective utilization of health services in Ethiopia. One study showed that potentially high financial and time costs seem to be the main reasons for not seeking treatment at public health facilities.⁵⁷ These barriers were reported to be particularly high for children and women.⁵⁸ Recently, the government has introduced a new healthcare financing mechanism to increase availability.

3. Assessment of key barriers to access

3.1. Health System Barriers

Studies show that healthcare-seeking behavior for childhood illnesses is generally low especially in rural parts of Ethiopia.^{59,60} For example a study done in Derra District, Oromia Regional State showed that surveyed mothers sought care from health facilities only for less than half of sick rural children (43.2%) as compared to urban (87.2%).⁶¹ According to this study mothers' responses and actions were frequently influenced by their perception of severity or worsening of illness. Lack of money, distances and perception of the illness not being serious were the major reasons for not seeking care. This study also identified residence and knowledge as the major predictors of healthcare-seeking practices from health facilities.⁵²

⁵⁷ Hailemariam D & Kloos H (2005), *Modern health services*. In ed. Berhane Y, Hailemariam D, Kloos H, The epidemiology and ecology of health and disease in Ethiopia

⁵⁸ CSA (2009), Health and Nutrition Survey

⁵⁹ Save the Children USA (2009), Innovation for Scale: Enhancing Ethiopia's Health Service Extension Program in the Southern Nations and Nationalities People's Region (SNNPR)

⁶⁰ Deressa, et al. (2007), "Maternal responses to childhood febrile illnesses in an area of seasonal malaria transmission in rural Ethiopia" *Acta Tropica* 102: 1-9

⁶¹ Assafa et al. (2008), Mothers' Healthcare-Seeking Behavior for Childhood Illnesses in Derra District, Northshoa Zone, Oromia Regional State, Ethiopia, *Ethiop J Health Sci.* 18: 87 - 95

Although IMNCI program covers a good number of health posts and health centers throughout the country, there are still some which are left uncovered. According to FMOH, the situation is even worse in the pastoralist regions of Afar, Benishangul-Gumuz, Gambella and Somali where the health service coverage and the training and skills of HEWs are lower. Only 42 % of the required number of Urban HEWs are deployed in Tigray, Amhara, Oromiya; SNNP, Harari, Dire Dawa; and Addis Ababa (a total of 2,319 Urban HEWs).⁶²

A recent national survey of health posts revealed that, the proportion of HEWs who are trained to treat malaria, diarrhea and pneumonia is low. According to this survey, the proportions of HEWs who were trained on how to treat diarrhea, pneumonia, and malaria in children were 30%, 18%, and 38% respectively.⁶³

There is also a weak linkage between health centers and health posts, which makes it difficult to properly monitor and evaluate the work done by HEWs. Without appropriate monitoring and supervision, it is hard to ensure the quality of care and health education provided by the HEWs to the community.⁶⁴

Currently, in Ethiopia, the total resource being directed to health is quite low both in absolute terms as well as when compared with the resource requirement to achieve the MDGs and in comparison with the spending level in other countries of similar socio economic status. The main sources of finance in the Ethiopian health sector are donors, households (out of pocket) and the government in order of priority each accounting for 37%, 31% and 28%, respectively.^{65,66} The low level of government expenditure and heavy reliance on support from donors has a big impact on the sustainability of the health services provision in the country.

Sustainability in Ethiopia's health system especially with regard to the supply of medicines is a major concern in the country. The majority of the medicines used in the treatment of diarrhea, malaria and pneumonia are supplied to the society through support obtained from various NGOs and international organizations like the UNICEF. The other major concern is the limited local production capacity according to local pharmaceutical manufacturers. The constraints commonly mentioned by manufacturers to scale up their production capacity are: financial problem, limitation of technical capacity, stiff and lengthy registration requirement, and poor marketing strategies. There is also high staff turnover due to lack of incentives.

Moreover, there is a low level of product availability at the health post level for products like malaria RDTs, Coartem® (especially the 1x6 and 2x6 tabs), and ORS. Proportion of HEWs and *woreda* level healthcare staff who are trained in supply chain management (SCM) is very low (only 11% of the HEWs and 31% of *woreda* health office staff). In Ethiopia, most of the facilities

⁶² FMOH (2010), Health Sector Development Program IV 2010/11 – 2014/15

⁶³ JSI and SC4CCM, 2010 Improving Supply Chain for Community Case Management of Pneumonia and Other Common Childhood Illnesses: Baseline Assessment (Preliminary Report)

⁶⁴ FMOH (2011), Health Post Health Center Linkage implementation manual

⁶⁵ Yusuf and Gebremedhin (2009), Situational Analysis of Healthcare Financing Reform Implementation in Five Districts of South Wollo Zone of Amhara Region, Ethiopia: Successes and Challenges, Save the Children UK

⁶⁶ Wamai RG (2009), Reviewing Ethiopia's Health System Development, JMAJ 52(4): 279–286

at the regional, zonal, *woreda* and health center level use some form of stock keeping document, whether a bin card, stock card or both, to record stock transactions. But at the health post level the majority of HEWs (86%) use no stock keeping documentation at all. Moreover, the majority of health posts do not fulfill adequate storage conditions.⁶⁷

Information from partners (international organizations and NGOs) shows their concern on the distribution capacity of the national supply agency (PFSA) which is currently responsible for the distribution of ICCM training and starter kits (Annexes 1 and 2).

The private sector in Ethiopia plays an important role in the provision of health services in urban and rural parts of the country. In these private clinics, there is low level of adherence to STGs and IMNCI guidelines and the situation is aggravated by the fact that trainings on IMNCI are focused on health professionals working in public health facilities. Many private drug retail outlets in towns supply antibiotics for the treatment of pneumonia to patients without prescription. Apart from the ethical aspects of dispensing prescription drugs over the counter, majority of professionals in the drug retail outlets are also not trained in IMNCI.

3.2. Disease specific barriers

3.2.1. Diarrhea

A study conducted in 2009 demonstrated that the general availability of essential drugs in Ethiopia at the facility level was 91% based on selected essential drugs versus 84% based on prescriptions filled. However, less than half the prescribed drugs were obtained from the budget pharmacy, and one in six patients was forced to purchase drugs in the private sector, where drugs are roughly twice as expensive.⁶⁸ In addition, according to local suppliers, drugs imported by public supply agency, PFSA, are free of tax while private importers pay up to 8% tax on essential medicines they import.

Generally, ORS is available as it is also produced by local manufacturer. However, its wide utilization is limited due to inefficient distribution. Among those children that sought treatment, 31% of children with diarrhea reportedly received a rehydration solution from an ORS sachet or a recommended home fluid.⁶⁹ Antibiotics were used in 15.3% of the cases followed by zinc and antimotility drugs (1.5%, 1.1%, respectively).⁷⁰ According to FMOH and RHBs, these problems are related to awareness, attitudes and practices of patients/caregivers, providers, health facilities and suppliers. Thus, access to appropriate treatment of diarrhea in Ethiopia is constrained due to limited availability of drugs especially zinc, limited care-seeking, poor diagnosis and failure to provide appropriate treatment.

⁶⁷ JSI and SC4CCM, (2010), Improving Supply Chain for Community Case Management of Pneumonia and Other Common Childhood Illnesses: Baseline Assessment (Preliminary Report)

⁶⁸ Carasso et al., (2009), Availability of essential medicines in Ethiopia: an efficiency-equity trade-off? *Tropical Medicine and International Health*; 14(11):1394–1400

⁶⁹ CSA and ICF Macro (2011), Ethiopia Demographic and Health Survey 2011 – Preliminary Report

⁷⁰ FMOH (2010), Family health report evaluation of health extension program, 2010

Key barriers to diarrhea treatment include:

- There is low treatment-seeking behavior for diarrhea. Caregivers' lack of awareness on the causative factors and their perception influenced diarrhea disease management and treatment seeking behavior. The caregivers considered diarrhea as nonfatal. As a result, there is low treatment-seeking practice and low usage of anti-diarrheal drugs.⁷¹
- Lack of awareness in the community about ORS; in one study for instance, only two-thirds of women have heard about ORS. However, the contribution of HEWs in changing the knowledge of the community where they are working is encouraging.⁷²
- Lack of awareness in the community of the range of free services like ORS (only free services like vaccines, TB and HIV/AIDS services are widely known by the community); thus, utilization of ORS could be further improved by increasing the awareness of the free services available.⁷³
- According to FMHACA and private suppliers, there has been limited supply of zinc to meet the demand of the country. Although two formulations of zinc (Zinc Acetate and Zinc Sulphate) are registered by FMHACA mainly through UNICEF and PSI (Population Service International) initiatives, there are limited numbers of suppliers that import zinc. Since its registration, only limited number of zinc product was introduced into the country by private suppliers, which has been attributed to less customer demand and narrow profit margin of the drug.
- FMHACA registers zinc as a prescription-only drug. Thus, it is not sold in drug shops without prescription which compounds to the low levels of caregivers' awareness.
- Sustainability of medicines used for the treatment of diarrhea is the main challenge since local manufacturing is limited and those drugs are mainly supplied with the support of NGOs and international organizations.
- According to drug retail outlets and private clinics, there is lack of awareness among clinicians on proper treatment of under-five diarrhea. In addition, there is unnecessary use of antibiotics to treat diarrhea in under-five children.

3.2.2. Malaria

The following are key barriers for malaria treatment in children:

- Sustainable supply of medicines is a major concern in the Ethiopian healthcare system as it is heavily reliant on the international donors. The majority of the medicines used in the treatment of malaria are supplied to the society through support obtained from the Global Fund, PMI and international organizations like the UNICEF. This is especially the case for Coartem®. This situation may be improving as Indian, Chinese and an Ethiopian company, have started supplying generic products to PFSA. The other major concern in

⁷¹ CSA and ICF Macro (2011), Ethiopia Demographic and Health Survey 2011 – Preliminary Report

⁷² Neuse et. al. (2010), USAID/Ethiopia Integrated Family Health Program: Report of the Phase I Review

⁷³ Yusuf and Gebremedhin (2009), Situational Analysis of Healthcare Financing Reform Implementation in Five Districts of South Wollo zone of Amhara Region, Ethiopia: Successes and Challenges

the sustainable supply of these medicines is the limited local production capacity. The sole Ethiopian company, Addis Pharmaceutical Factory has an annual capacity to supply 31,375 of Artemeter /Lumefantrine (20/120mg) tablets in a pack of 2x12 which is far less than that supplied by PMI for a single region.

- There is low level of health service utilization especially in the peripheral regions of the country even though the health facility coverage is high.⁷⁴ Patients may consequently not go to the health facilities for treatment in a timely manner. The following are identified as reasons for low utilization.⁷⁵
 - Patient-related factors for not visiting health institutions were the belief that the illness was mild (28.3%), financial constraint (21.7%), workload of caretakers (19.6%) and distance of healthcare institutions (12.8%).
 - Perception by the community that the public health system, especially the health extension is inferior to the private sector even if free service is provided in the former. ^{76,77}
 - The community use of traditional or local remedies before going to any health institution, among other reasons accounts for the 4-5 days delay in seeking treatment at the health institutions.
- Incomplete availability of anti-malarial agents including artemether-lumefantrine at health posts level.⁷⁸
- In the private drug retail outlets, the medicines are expensive, especially Coartem®.
- Limited capacity by HEWs on exact diagnosis of malaria.

3.2.3. Pneumonia

The following are key barriers for pneumonia treatment in children:

- Limited care-seeking behaviors by caretakers (only 27%) for children with ARI symptoms.⁷⁹ Moreover, even though pneumonia is the leading killer of children in the developing world, only 1 of every 5 caregivers knows the two tell-tale symptoms of pneumonia: fast breathing and difficult breathing.⁸⁰
- In private retail outlets and clinics expensive drugs like ceftriaxone are prescribed as the first line treatment of pneumonia. Majority of healthcare providers in the private sector were not trained in [IMNCI](#). It is also a common practice among private clinics to prescribe antibiotics for simple conditions such as cough and common cold.

⁷⁴ FMOH (2010), Evaluation of Health Extension Program, Rural Ethiopia

⁷⁵ AMA (2011), KAP on Malaria Prevention and Control in Anti-Malaria Association Intervention Zones of the Amhara National Regional State, Ethiopia

⁷⁶ Deressa and Ali (2009), Malaria-related perceptions and practices of women with children under the age of five years in rural Ethiopia, *BMC Public Health* 2009, **9**:259 doi:10.1186/1471-2458-9-259

⁷⁷ Deressa et al (2008). Malaria-related health-seeking behaviour and challenges for care providers in rural Ethiopia: implications for control. *J Biosoc Sci.* 40:115-35.

⁷⁸ Daniel G et al (2012), Pilot assessment of supply chains for pharmaceuticals and medical commodities for malaria, tuberculosis and HIV infection in Ethiopia. *Trans R Soc Trop Med Hyg* 106 : 60-62

⁷⁹ CSA and ICF Macro (2011), Ethiopia Demographic and Health Survey 2011 – Preliminary Report

⁸⁰ UNICEF/ WHO (2006), Pneumonia the forgotten killer of children

- Shortage of drugs for treatment of pneumonia in public health facilities.⁸¹
- Many private drug retail outlets in towns supply antibiotics for pneumonia without prescription orders. In private sector selection and drug procurement is usually based on customer demand and/or profitability
- Cotrimoxazole pediatric tablet is not manufactured locally. Financial problem, capacity limitation, stringent registration requirements, poor marketing strategies, and staff turnover are challenges for local manufacturers.
- Dispersible Amoxicillin tablet is not registered by FMHACA.

The major barriers to treatment in under-five are summarized in Table 1. The main barriers and ongoing efforts are given in Table 2.

⁸¹Degefie et al., (2009), Community case management improves use of treatment for childhood diarrhea, malaria and pneumonia in a remote district of Ethiopia. *Ethiop. J. Health Dev.* 23(2)

Table 1: Barriers to access to appropriate treatment

	Patient	Public sector supply/provision (incl. community-level)	Private sector supply/provision
Cross-disease	<ul style="list-style-type: none"> ▪ Low level of healthcare- seeking behavior 	<ul style="list-style-type: none"> ▪ Low level of government funding to the health sector ▪ High turnover of staff for implementation of IMNCI program ▪ Weak linkage between health posts and health centers ▪ Shortage of essential medicines ▪ Poor SCM practices in Health posts and <i>woreda</i> health offices ▪ Low health service coverage in pastoralist regions 	<ul style="list-style-type: none"> ▪ Limited capacity of local manufacturers ▪ Deviation of treatment from guideline ▪ IMNCI training lacks focus on private health facilities
Diarrhea	<ul style="list-style-type: none"> ▪ Lack of awareness for free services for diarrhea treatment ▪ Less use of ORS (only 31% of children with diarrhea received ORS or a recommended home fluid) ▪ Limited awareness of caregivers on causative factors ▪ Less treatment-seeking behavior 	<ul style="list-style-type: none"> ▪ Shortage of zinc, seasonal shortage of ORS in the public health facility especially health posts (distribution inefficiency) 	<ul style="list-style-type: none"> ▪ Limited supplier of zinc: problem of access and high price as there is no market competition ▪ Didn't perceive zinc as a profitable product due to the low consumer demand at present ▪ Zinc registered as prescription only drug ▪ Lengthy drug registration process at the regulatory authority
Malaria	<ul style="list-style-type: none"> ▪ Low utilization of health services ▪ Late treatment- seeking due to low perception of HEWs ▪ Low adherence to full treatment 	<ul style="list-style-type: none"> ▪ No clear guideline on the diagnosis of malaria for health centers and that considers children ▪ Incomplete availability of anti-malaria drugs ▪ Low availability of ITNs 	<ul style="list-style-type: none"> ▪ Un-affordability of Coartem® and services
Pneumonia	<ul style="list-style-type: none"> ▪ Limited care- seeking behaviors ▪ Poor symptoms recognition 	<ul style="list-style-type: none"> ▪ Misdiagnosis of pneumonia ▪ Limited knowledge on supply management among HEWs ▪ Less availability of drugs in public health facilities ▪ Delay in the preparation of kits 	<ul style="list-style-type: none"> ▪ Poor local manufacturing capacity ▪ Poor drug selection and procurement by private suppliers/retailers

Table 2: Barriers and ongoing efforts

	Patient		Public sector supply/provision (including community-level)		Private sector supply/provision	
	Barriers	Current efforts	Barriers	Current efforts	Barriers	Current efforts
Cross-disease	<ul style="list-style-type: none"> ▪ Low level of healthcare- seeking behavior 	<ul style="list-style-type: none"> ▪ Training of VCHWs 	<ul style="list-style-type: none"> ▪ Low level of government funding to the health sector ▪ High turnover of staff for implementation of IMNCI program ▪ Weak linkage between health posts and health centers ▪ Shortage of essential medicines ▪ Poor SCM practices in Health posts and <i>woreda</i> health offices ▪ Low health service coverage in pastoralist regions 	<ul style="list-style-type: none"> ▪ Movements to abide by the Abuja Declaration ▪ Manual has been prepared to specify the linkages between health posts and health centers ▪ Efforts are underway to train HEWs through health center staff 	<ul style="list-style-type: none"> ▪ Limited capacity of local manufacturers ▪ Deviation from guideline in treatment ▪ IMNCI training lacks focus on private health facilities 	<ul style="list-style-type: none"> ▪ Incentives provided by PFSA-gives local manufacturers priority in international tenders
Diarrhea	<ul style="list-style-type: none"> ▪ Low treatment-seeking behavior ▪ Low usage of ORS ▪ Lack of access to safe water supply 	<ul style="list-style-type: none"> ▪ Introduction of ICCM⁸² ▪ PSI- led social marketing effort to use water treatment chemicals (disinfectants) and bring behavioral change (e.g. use of boiled water) ▪ Federal Ministry of Water and Energy, along with FMOH are working to improve coverage of clean water⁸³ 	<ul style="list-style-type: none"> ▪ Limited availability of zinc ▪ ORS stock out ▪ Inconsistent supply of ORS to health posts 	<ul style="list-style-type: none"> ▪ PSI-led social marketing effort to introduce zinc and increase demand ▪ Increase in ORS production capacity in one of the pharmaceutical industries (EPHARM) 	<ul style="list-style-type: none"> ▪ Limited availability and higher price of zinc ▪ Zinc registered as a prescription-only drug 	<ul style="list-style-type: none"> ▪ NGOs working to increase access by selling at reduced price; co-packing of Zinc and ORS (e.g., Adey kit) ▪ PSI is planning to work with FMHACA and FMOH to register zinc as an OTC drug

⁸² FMOH (2005), HSDP-III

⁸³ ADF (2005), Rural Water Supply and Sanitation Program in Ethiopia: Appraisal Report

Malaria	<ul style="list-style-type: none"> ▪ Low utilization of health services ▪ Late treatment-seeking due to low perception of HEWs ▪ Low adherence to full treatment ▪ Low utilization of ITNs ▪ Low acceptance of IRS 	<ul style="list-style-type: none"> ▪ BCC/IEC activities under way ▪ ICCM program started in selected regions 	<ul style="list-style-type: none"> ▪ High workload of the HEWs ▪ There is poor retention of HEWs ▪ Limited capacity of HEWs ▪ Incomplete availability of drugs ▪ Unavailability of LMIS tools and guidelines ▪ Weakness in human resource capacity ▪ Poor organizational structure ▪ Budget constraint ▪ No clear guideline on the diagnosis of malaria for HCs and that considers children ▪ Low availability of ITNs 	<ul style="list-style-type: none"> ▪ Training and assigning volunteers to support HEWs in carrying out BCC/IEC activities in selected zones of the Amhara Regional State ▪ Plan and preparations to upgrade the theoretical knowledge of the country's 33,000 rural HEWs to that of Health Extension Practitioners ▪ A new integrated pharmaceutical supply system is being rolled out and trainings given by PFSA ▪ Malaria Diagnosis and Treatment Guidelines for Health Workers in Ethiopia is prepared and chapters are included for the diagnosis and treatment of malaria and its complications in children. ▪ PMI and Global Fund financing anti-malaria drugs procurement including for severe disease and pre-referral care ▪ LLIN being distributed 	<ul style="list-style-type: none"> ▪ Un-affordability of Coartem® and services 	<ul style="list-style-type: none"> ▪ Local suppliers have started manufacturing Coartem® and import generic products also
Pneumonia	<ul style="list-style-type: none"> ▪ Limited care seeking behaviors 	<ul style="list-style-type: none"> ▪ Pneumonia case management included in ICCM package⁸⁴ ▪ Formation of 'women health army' in regions to facilitate implementation of HEP 	<ul style="list-style-type: none"> ▪ Misdiagnosis of pneumonia ▪ Limited knowledge on supply management among HEWs ▪ Less availability of drugs in public health facilities ▪ Delay in the preparation of kits 	<ul style="list-style-type: none"> ▪ Training was given for HEWs on management of pneumonia³⁵ ▪ SC4CCM and PFSA currently providing training on drug supply management⁹ ▪ Government introduced a new healthcare financing mechanism to increase availability¹³ ▪ Pneumococcal vaccine was introduced by FMOH⁴ ▪ Efforts are underway to increase the role of the RHBs in the distribution and management of kits 	<ul style="list-style-type: none"> ▪ Poor local manufacturing capacity ▪ Poor drug selection and procurement by private suppliers/retailers 	<ul style="list-style-type: none"> ▪ PFSA is giving priority to local manufacturers in its tender to procure drugs ▪ FMHACA has been supporting local manufacturers to fulfill GMP standards ▪ PSI has been helping Micropharma, a local supplier, in the process of registration and import

⁸⁴FMOH, (2010), National Implementation Plan for Community-based Case Management of Common Childhood Illnesses

4. Proposed program of targeted intervention

4.1. Vision and Objectives of FMOH

The plans of the FMOH by the end of 2015 are envisaged in the HSDP IV plan document: ⁸⁵

Cross-disease:

- Roll out community case management for common childhood illnesses in all health posts and increase proportion of health centers and hospitals that implement IMNCI to 100% from 52% and 62% respectively.
- Decrease under-five mortality rate from 101 to 68 per 1000 live births.
- Increase the proportion of model household graduated by HEP from 25.6% to 85%.

Diarrhea:

- To increase the proportion of diarrhea cases taking more fluid or ORS or a recommended home fluid from 37% to 65% and 89% (base case scenario and best case scenario, respectively).
- To increase percentage of children with diarrhea who are treated with zinc at community level from 0% to 62% and 75% (base case scenario and best case scenario respectively).
- To increase proportion of cases of diarrhea and fevers treated with antibiotics from 6% to 43% and 88% (base case scenario and best case scenario respectively).

Malaria:

- Increase % of children treated for malaria at community level from 3% to 21% and 29% (base case and best case scenario respectively).
- Reduce lab confirmed (RDT/microscopy) malaria case fatality ratio among children less than 5 years old and adults to less than 2%.
- Reduce lab confirmed (RDT/Microscopy) malaria incidence per year, among children less than 5 years old and adults to less than 5 per 1000 population per year.
- 100% of suspected malaria cases are diagnosed using RDTs and or microscopy within 24 hours of the onset of fever.
- No monthly malaria cases report for 24 months from previously malarious *kebele's* of targeted *woreda's* for elimination of malaria.

Pneumonia:

- Increase proportion of under-5 children with pneumonia who received antibiotics at community level from HEWs from 0 to 17% and 41% (base case and best case scenario respectively).
- Increase Penta 3, Measles, Full, Rota Virus and Pneumococcal immunization coverage from 82%, 76.6%, 65.6%, 0%, and 0%, respectively to 90%.

⁸⁵ FMOH (2010), HSDP-IV

4.2. Proposed interventions

4.2.1. Health Systems Strengthening

- **Strengthen IEC/ BCC programs (cross-diseases)**

Currently, health education centers are functional in many regions run by NGOs and RHBs. In most regional health bureaus, IEC/BCC focal points have been established, where various mass media such as radio, television, and electronic health learning materials are available. However, due to lack of trained and skilled professionals, the quality of IEC activities is highly variable.⁸⁶ Therefore the need for strengthening the IEC activities and giving more emphasis on childhood illnesses cannot be overstated. The program should target health workers, community leaders, and communities to increase treatment-seeking behavior, compliance, identifying early signs of childhood illnesses (like fever, fast/difficult breathing, and diarrhea) and use the IMNCI/ICCM services.

- **Train public and private sector health care professionals (cross-disease)**

Adequate number of healthcare staff, both in number and skill mix, is one of the major concerns in the delivery of both preventive and curative services of childhood illnesses. Moreover, training and retention of experienced staff in the health sector is of paramount significance to the success of IMNCI program. As a result strengthening of the current efforts in terms of integrated on-the-job and refresher trainings of health post and other health sector staff should not be overlooked. Staff motivation schemes should be strengthened and be implemented all over the healthcare system based on merit. Healthcare professionals and administrators in the pastoralist and historically disadvantaged regions of the country should be given priority to develop their skill and executive capacity. As an important component of healthcare provision, health professionals in private health facilities should be given due emphasis in the organization of trainings and distribution of guidelines in the area of IMNCI/ ICCM.

- **Improving pharmaceuticals supply (cross-disease)**

Limited local production and distribution capacity and high reliance on external assistance for the supply of pharmaceuticals are the major challenges to ensure sustainable supply of medicines and supplies used in prevention and treatment common childhood illnesses in Ethiopia. Improving the production capacity of local manufacturers for drugs used in the treatment of childhood diarrhea, pneumonia and malaria through different incentives, outsourcing supply activities of IMNCI and ICCM kits to the private sector and devising mechanisms to solicit sustainable funds from local sources are important interventions to ensure constant supply of pharmaceuticals. To this effect, strengthening the public-private-partnerships (PPPs) with the objective of enhanced self-reliance for the supply of medicines and quality services for childhood

⁸⁶ HNP Discussion Paper (2009), Ethiopia: Improving Health Service Delivery

illnesses is of paramount significance. This can be done in the areas of pharmaceuticals production, their supply and provision of services.

- **Increasing coverage of IMNCI/ICCM program (cross-disease)**

The implementation of IMNCI/ICCM in some parts of the country shows a significant decrease in under-five morbidity and mortality. But service coverage is only limited to few public health facilities and even those health facilities have inadequate number of trained professionals. Assessment of the private sector also revealed that let alone practicing it, they do not know the existence of the program. Hence, scaling-up of intervention followed by creating awareness needs to be materialized in all public and private health institutions with special emphasis to pastoralist areas. In addition, it is important to provide training to HEWs at entry point, in-service training, conduct review meeting and assess quality of care. HEWs need to continue to deliver education on recognition of illness, knowledge of danger signs, and the importance of prompt care-seeking.

- **Monitoring and evaluation (M&E) system (cross-disease)**

M&E information systems measure the coverage, utilization and health impacts of interventions, with a view to making informed adjustments in future planning. Despite the ongoing efforts, significant attention to M&E at country level is still required. M&E should be essential components of diarrhea, pneumonia and malaria control programs to track effectiveness of the interventions over time and take corrective measures. Activities involve assessment of routine health services data and periodic community and household surveys to develop process indicators for implementation, and outcome indicators for case management, prevention, and program impact. In addition, the effectiveness of drugs used for treatment of those diseases must be monitored in terms of development of resistance and rational utilization. Increasing staff dedicated to M&E and building capacity are essential. Hence, the current efforts to strengthen the HMIS of Ethiopia should be encouraged.

4.2.2. Diarrhea specific interventions

- **Co-packaging and/or co-marketing of zinc and ORS (Diarrhea)**

According to information from FMOH partners, so far a lot of efforts have been made to promote the co-packaging and/or co-marketing of zinc and ORS. However, there are a number of potential obstacles related to financing, training, service delivery, and demand creation that are currently limiting scale-up of these strategies and that require urgent attention. Hence, efforts of FMOH and its partners are underway to improve the usage of these products and there is also a plan to make the drug available in the private sector.

- **Changing the prescription status of zinc to OTC (Diarrhea)**

In Ethiopia there is low usage and demand for zinc.⁸⁷ The main reasons being zinc is currently prescription-only drug and not widely promoted. There is evidence that promotion of zinc for diarrhea treatment alongside ORS can increase its consumption. This would reduce unnecessary antibiotic use and reinvigorate community management of diarrhea. As the OTC status could expand the accessibility and usage, PSI is working with FMHACA to reclassify the drug as OTC and promote the drug.

4.2.3. Pneumonia specific interventions

- **Support introduction of pneumococcal vaccine (Pneumonia)**

Ethiopia has introduced pneumococcal vaccine to further accelerate its efforts of reducing child death further and achieve MDG-4 by 2015. In addition, the national scale-up of community-based treatment of pneumonia with oral antibiotics by HEWs will also help further reduce child mortality significantly in Ethiopia.⁸⁸

- **Immunization (Pneumonia)**

Immunization against Hib, measles, and pertussis helps reduce childhood deaths from pneumonia in two ways. It can help prevent children from developing infections that directly cause pneumonia; it may prevent infections that can lead to pneumonia as a complication; and these vaccines have the potential to significantly reduce child death from pneumonia.

4.3. Potential Deaths Averted among Children Under-5

Through consultations with the Ministry of Health, realistic coverage targets for the national scale up of treatment for diarrhea (ORS + zinc), pneumonia, and malaria were set at 70%, 70% and 100% of positive cases, respectively, by 2015. Based on these targets, the Lives Saved Tool (LiST), a child survival modeling tool utilizing country-specific data, was used to assess the potential impact of the above interventions on the number of under-5 deaths/ lives saved. Data sources for Ethiopia include the most recent (2008) demographic data the United Nations Population Division, 2005 DHS, 2007 MIS and cause mortality data from 2008⁸⁹.

The annual coverage rates for the scale up of the three interventions are given in Table 3, below. The scale-up scenario assumes a linear increase in coverage from the baseline coverage year, 2012 and through 2015. Each intervention was run independently and cumulatively to determine the number of child deaths averted.

⁸⁷ FMOH(2010), Family health report evaluation of health extension program, 2010

⁸⁸GAVI press release, (2011) GAVI Alliance partners to tackle childhood killer in Ethiopia

⁸⁹ Blacket et al. Global, regional, and national causes of child mortality in 2008: a systematic analysis. The Lancet (June 2010). 375: 9730, 1969-1987. DOI: 10.1016/S0140-6736(10)60549-1.

Table 3: LiST annual intervention coverage rates

Intervention	Coverage Rates (%)			
	2012	2013	2014	2015
ORS	20	37	53	70
Zinc	0	23	47	70
Oral antibiotics: case mgt. of pneumonia	5	27	48	70
Antimalarials	10	40	70	100

Table 4 summarizes the estimated impact of all three interventions and Tables 5, 6 and 7 give the impact of each intervention, independently of the other. An estimated total of 182,000 deaths among children under-5 can be prevented by scaling up treatment of diarrhea and pneumonia to 70% and malaria to 100% by 2015. Independently, scaling up diarrhea, pneumonia, and malaria can potentially prevent 101,000, 41,000, and 39,000 child deaths during the intervention period.

Table 4: Total number of deaths and lives saved from 2012-2015

	2012	2013	2014	2015	Total
No coverage	337,989	341,854	345,598	349,211	1,374,652
Deaths U5	337,989	311,171	285,261	260,077	1,194,498
Deaths averted U5	0	30,758	60,899	90,422	182,079
Diarrheal deaths averted w/ int.	0	17,108	33,210	48,277	98,595
averted from ORS	0	13,683	26,602	38,733	79,018
averted from Zinc	0	3,912	7,593	11,038	22,543
Pneumonia deaths averted w/ int.	0	6,658	13,507	20,564	40,729
Malaria deaths averted w/ int.	0	6,430	13,045	19,860	39,335

Table 5: Estimated Lives saved due to scaling up ORS and Zinc to 70% by 2015

	2012	2013	2014	2015	Total
No coverage	337,989	341,854	345,598	349,211	1,374,652
Deaths U5	337,989	324,261	311,670	300,146	1,274,066
Deaths averted U5	0	17,670	34,319	49,896	101,885
Diarrheal deaths w/o int.	75,069	76,041	76,994	77,914	306,018
Diarrheal deaths w/ int.	75,069	58,929	43,889	29,945	207,832
Diarrheal deaths averted w/ int	0	17,109	33,186	48,181	98,476
 averted from ORS	0	13,684	26,584	38,659	78,927
 averted from Zinc	0	3,912	7,588	11,016	22,516

Table 6: Estimated Lives Saved due to Scaling up Pneumonia Treatment to 70% by 2015

	2012	2013	2014	2015	Total
No coverage	337,989	341,854	345,598	349,211	1,374,652
Deaths U5	337,989	335,194	332,193	328,947	1,334,323
Deaths averted U5	0	6,731	13,632	20,702	41,065
Pneumonia deaths w/o int.	41,788	42,330	42,860	43,373	170351
Pneumonia deaths w/ int.	41,788	35,671	29,387	22,928	129774
Pneumonia deaths averted w/ int.	0	6,658	13,488	20,487	40633

Table 7: Estimated Lives Saved due to Scaling up Malaria Treatment to 100% by 2015

	2012	2013	2014	2015	Total
No coverage	337,989	341,854	345,598	349,211	1,374,652
Deaths U5	337,989	335,422	332,653	329,642	1,335,706
Deaths averted U5	0	6,503	13,170	20,000	39,673
Malaria deaths w/o int.	23,053	23,351	23,644	23,926	93,974
Malaria deaths w/ int.	23,053	16,920	10,626	4,164	54,763
Malaria deaths averted w/ int.	0	6,430	13,026	19,785	39,241

4.4. Cost of Proposed interventions

4.4.1. Cost of Commodities Required for Scale up of IMCI and CCM

The total cost from 2012 to 2015 for medicines alone for the national scale up of treatment for 70% of all diarrhea and pneumonia cases in children under 5, and 100% of all under-5 malaria cases by 2015 is estimated to be \$93,753,127 USD: \$41,758,971 for diarrhea, \$9,910,397 for pneumonia and \$50,083,760 for malaria. A method highlighting morbidity and target population was used to quantify the total costs for medicines for the treatment of each of the key diseases.

Table 8 shows the unit costs, treatment guideline, incidence per child and the total cost for treatment per child for medicines needed to treat the three key diseases. The price of the medicines are based on a recent quantification exercise done by the Pharmaceutical Fund and Supply Agency (PFSA) and Supply Chain for Community Case Management (SC4CCM) project in which price data from UNICEF, PFSA and the 2010 International Drug Price Indicator Guide were used. The costs of the medicines also take into account 5% for wastage.

Incidence rates for each of the diseases are assumed to be 4 episodes per child per year for diarrhea and 0.35 episodes per child per year for pneumonia. Basic assumptions for malaria include the following:

- 1.2 malaria episodes per child per year;
- RDT positivity rate is 40% and the *P. falciparum* *P. vivax* proportion is 60% and 40%, respectively;
- Proportion of under 2 children is 35% (ACT 6X1);
- Proportion of children above age 2 is 65% (ACT 6X2);
- Proportion of under 3 children is 56% (Chloroquine syrup);
- Proportion of children above 3 is 44% (Chloroquine tablet); and
- Proportion of febrile cases that need symptomatic treatment with paracetamol is 40%.

Additionally, to quantify the annual costs of medicines based on treatment coverage, the population growth rate is kept constant at 1.8% (UNICEF population growth rate from 2010-2030) and the percentage of the population under-5 is based on population data from the MOH and assumed to be constant for each region (see Annex 4 for details). The annual costs for each intervention (shown in Table 9) are based on the LiST coverage rate assumptions given in Table 3. Detailed quantifications for the cost of medicines are given in Annex 4 (diarrhea), Annex 5 (pneumonia), and Annex 6 (malaria).

Table 8: Annual cost of medicines per child under five

Medicine	Unit price (USD)	Treatment guideline per case	Incidence per child per year	Annual Cost per Child (USD)
ORS Sachets (low osmolarity)	0.09	2 sachets	4	0.72
Zinc 20 mg tablets	0.031	10 tablets	4	1.24
Cotrimoxazole 120 mg tablets	0.0088	30 tablets	.35	0.0924
Rapid Diagnostic Test (RDT)	0.67	1 RDT	1.2	0.804
ACT 6x1	0.36	1 dose	0.1008	0.0363
ACT 6x2	0.72	1 dose	0.1872	0.1348
Chloroquine 50mg/5ml Syrup	0.33	1 bottle	0.10752	0.0355
Chloroquine tablets 250 mg	0.0103	4 tablets	0.33792	0.0139
Paracetamol tablets 100mg	0.00572	10 tablets	4.8	0.2746

Table 9: Total cost of medicines per year from 2012-2015

Intervention	2012	2013	2014	2015	Total
Diarrhea	1,907,535	7,438,442	13,239,229	19,173,765	41,758,971
Pneumonia	61,200	336,429	608,862	903,906	1,910,397
Malaria	10,775,938	11,914,120	13,089,786	14,303,915	50,083,760
TOTAL	12,744,673	19,688,991	26,937,877	34,381,586	93,753,127

4.3.2 Estimated cost of interventions

The total cost (2012-2015) for the national scale up for the treatment of diarrhea, pneumonia and malaria is estimated to be \$122,867,408 USD and will prevent over 182,000 child deaths. This cost includes distribution of the medicines, training of health care workers and supervision. The cost of the medicines and distribution includes 5% for wastage, 20% for insurance, freight and handling, and 5% for distribution costs.

Currently, training is already planned for all 36,000 HEWs and so far 15,000 HEWs have been trained. The estimated cost for training takes this into consideration and the cost expressed in Table 10 reflects the costs associated with training the remaining HEWs. The unit cost for each training session is \$5,460 USD and for \$2,000 USD for each review meeting and monitoring session. Additionally, it is assumed that the training will occur only in 2012. A total of 400 will be needed to train the HEWs and 200 sessions to train supervisors. The MoH further estimated 1,200 sessions for review and monitoring meetings.

The costs for RDTs, ACT 6x1 and 6x2, zinc tablets and cotrimoxazole are already covered and account for 70% of the medicines cost for 2012. The major gaps still to be covered are 30% of the medicines cost and 100% of costs for distribution, trainings, and review meetings.

Table 10: Total cost of the interventions

	Total Cost (USD)
Cost for Diarrhea Medicines with 5% wastage	41,758,971
Cost for Pneumonia Medicines with 5% wastage	1,910,397
Cost for Malaria Medicines with 5% wastage	50,083,760
Total cost of Medicines for 3 diseases	93,753,127
Cost for insurance, freight, and handling 20%	18,750,625
Cost for distribution: from Central warehouse to health facilities 5%	4,687,656
Cost for HEW training: 10,000 HEW to be trained in 400 sessions (only in 2012)	2,184,000
Cost for supervisors training: 5,000 supervisors to be trained in 200 sessions (only in 2012)	1,092,000
Cost for review meetings and monitoring, 1200 sessions	2,400,000
Total cost for all activities from 2012-2015	122,867,408

Annex 1: Contents of starter kit⁹⁰

No	Category/ program	Item	Unit	Qty/HP
1	Diarrhea	Zinc 20mg of 100 tab	Tin	70
2	Diarrhea	ORS sachet	Sachet	1000
3	Fever	Paracetamol 100mg of 1000	Box	1
4	Malaria	Coartem 6x1 Of 30 tabs*	Box	2
5	Malaria	Coartem 6x1 Of 30 tabs*	Box	2
6	Malaria	Coartem 6x2 Of 30 tabs*	Box	1
7	Malaria	Coartem 6x3 Of 30 tabs*	Box	2
8	Malaria	Chloroquine 250mg of 1000 tabs (100x10)*	Box	1
9	Malaria	RDT of 40 tests*	Pack	10
10	Malnutrition	Amoxicillin 125mg susp	Bottle	12
11	Malnutrition	Amoxicillin 250mg capsule of 10	Strip	10
12	Malnutrition	RUTF/Plumpy nut	Sachet	300
13	Malnutrition	Folic acid 5 mg of 10	Box	1
14	Malnutrition	Mebendazole 100mg of 100	Pack	2
15	Newborn care	Tetracycline Eye Ointment 1% of 50	Box	1
16	Pneumonia	Cotrimoxazole 120mg of 100 tabs	Tin	30

* Not included in the kits for non-malarious 'Kebeles'

⁹⁰ PFSA (2011), National Quantification Exercises Report for Integrated Community Case Management of Common Childhood Illnesses (ICCM) in Ethiopia, Products Requirements for 2012 to 2014

Annex 2: HEWs Training (February- September 2011) kit⁹¹

Use	Pack-size : individual item	Qty per HEW
Pneumonia	Cotrimoxazole, bottle of 100 tabs	10
Pneumonia	watch for HEW	1
Dehydration	ORS, sachet	100
Malnutrition	Plumpy Nut, sachet	15
Malnutrition	MUAC tape, piece	5
Malnutrition	Amoxicillin 125mg suspension, bottle	1
Malaria	Coartem 1x6, strip	3
Malaria	Coartem 2x6, strip	3
Malaria	Chloroquine syrup, bottle	2
Malaria	RDT, test	20
Training	IMNCI chart booklet for HEW	1
Training	IMNCI Exercise booklet for HEW	1
Training	IMNCI registration book 0-2m	0.5
Training	IMNCI registration book 2m-5yrs	0.5
Training	Bag for HEW	1

⁹¹ PFSA (2011), National Quantification Exercises Report for Integrated Community Case Management of Common Childhood Illnesses (ICCM) in Ethiopia, Products Requirements for 2012 to 2014

Annex 3: Percentage of Under-5 Population per Region in Ethiopia

Region	Total Population	under 5 Population	Percent U5 population
Addis Ababa	3,038,096	217,528	7.16%
Afar	1,573,294	158,273	10.06%
Amhara	18,727,852	2,535,751	13.54%
Benshangul Gumuz	777,696	125,831	16.18%
Dire Dawa	387,877	47,088	12.14%
Gambella	375,209	50,728	13.52%
Hareri	208,451	26,848	12.88%
Oromia	31,331,572	5,147,777	16.43%
SNNPR	17,353,928	2,708,948	15.61%
Somali	5,047,035	885,000	17.54%
Tigray	4,881,411	712,198	14.59%
Total	83,702,421	12,615,970	15.07%

Annex 4: Quantification for Diarrhea Treatment from 2012-2015

2012					
Region	Total Population	Under 5 Population	Anticipated Diarrhoea cases/year	ORS Sachets requirement/year (Low-osmolarity)	Zinc tablets requirement 20 mg (Scored, dispersible)
Addis Ababa	3,038,096	217,528	870,112	348,045	-
Afar	1,573,294	158,273	633,092	253,237	-
Amhara	18,727,852	2,535,751	10,143,004	4,057,202	-
Benshangul Gumuz	777,696	125,831	503,324	201,330	-
Dire Dawa	387,877	47,088	188,352	75,341	-
Gambella	375,209	50,728	202,912	81,165	-
Hareri	208,451	26,848	107,392	42,957	-
Oromia	31,331,572	5,147,777	20,591,108	8,236,443	-
SNNPR	17,353,928	2,708,948	10,835,792	4,334,317	-
Somali	5,047,035	885,000	3,540,000	1,416,000	-
Tigray	4,881,411	712,198	2,848,792	1,139,517	-
Total	83,702,421	12,615,970	50,463,880	20,185,552	-
Wastage 5%				1,009,278	-
Cost (USD)				1,907,535	-
Total Cost for Diarrhoea Medicines (USD)				1,907,535	

2013					
Region	Total Population	under 5 Population	Anticipated Diarrhoea cases/year	ORS Sachets requirement/year (Low-osmolarity)	Zinc tablets requirement 20 mg (Scored, dispersible)
Addis Ababa	3,092,782	221,444	885,774	655,473	2,037,280
Afar	1,601,613	161,122	644,488	476,921	1,482,322
Amhara	19,064,953	2,581,395	10,325,578	7,640,928	23,748,830
Benshangul Gumuz	791,695	128,096	512,384	379,164	1,178,483
Dire Dawa	394,859	47,936	191,742	141,889	441,007
Gambella	381,963	51,641	206,564	152,858	475,098
Hareri	212,203	27,331	109,325	80,901	251,448
Oromia	31,895,540	5,240,437	20,961,748	15,511,693	48,212,020
SNNPR	17,666,299	2,757,709	11,030,836	8,162,819	25,370,923
Somali	5,137,882	900,930	3,603,720	2,666,753	8,288,556
Tigray	4,969,276	725,018	2,900,070	2,146,052	6,670,162
Total	85,209,065	12,843,057	51,372,230	38,015,450	118,156,129
Wastage 5%				1,900,773	5,907,806
Cost (USD)				3,592,460	3,845,982
Total Cost for Diarrhoea Medicines (USD)				7,438,442	

2014					
Region	Total Population	under 5 Population	Anticipated Diarrhoea cases/year	ORS Sachets requirement/year (Low-osmolarity)	Zinc tablets requirement 20 mg (Scored, dispersible)
Addis Ababa	3,148,452	225,429	901,718	955,821	4,238,074
Afar	1,630,442	164,022	656,088	695,454	3,083,616
Amhara	19,408,122	2,627,860	10,511,438	11,142,125	49,403,761
Benshangul Gumuz	805,945	130,402	521,607	552,903	2,451,552
Dire Dawa	401,966	48,798	195,194	206,905	917,410
Gambella	388,838	52,571	210,283	222,900	988,328
Hareri	216,023	27,823	111,293	117,970	523,077
Oromia	32,469,660	5,334,765	21,339,059	22,619,403	100,293,579
SNNPR	17,984,292	2,807,348	11,229,391	11,903,155	52,778,139
Somali	5,230,363	917,147	3,668,587	3,888,702	17,242,359
Tigray	5,058,723	738,068	2,952,272	3,129,408	13,875,676
Total	86,742,828	13,074,232	52,296,930	55,434,746	245,795,571
Wastage 5%				2,771,737	12,289,779
Cost (USD)				5,238,583	8,000,646
Total Cost for Diarrhoea Medicines (USD)				13,239,229	

2015					
Region	Total Population	under 5 Population	Anticipated Diarrhoea cases/year	ORS Sachets requirement/year (Low-osmolarity)	Zinc tablets requirement 20 mg (Scored, dispersible)
Addis Ababa	3,205,124	229,487	917,949	1,285,128	6,425,642
Afar	1,659,790	166,975	667,898	935,057	4,675,286
Amhara	19,757,469	2,675,161	10,700,644	14,980,902	74,904,511
Benshangul Gumuz	820,452	132,749	530,996	743,394	3,716,970
Dire Dawa	409,202	49,677	198,707	278,190	1,390,950
Gambella	395,837	53,517	214,068	299,695	1,498,474
Hareri	219,911	28,324	113,296	158,615	793,073
Oromia	33,054,114	5,430,791	21,723,162	30,412,427	152,062,137
SNNPR	18,308,009	2,857,880	11,431,520	16,004,128	80,020,642
Somali	5,324,510	933,655	3,734,622	5,228,470	26,142,351
Tigray	5,149,780	751,353	3,005,412	4,207,577	21,037,887
Total	88,304,199	13,309,569	53,238,275	74,533,585	372,667,923
Wastage 5%				3,726,679	18,633,396
Cost (USD)				7,043,424	12,130,341
Total Cost for Diarrhoea Medicines (USD)				19,173,765	

Annex 5: Quantification for Pneumonia Treatment from 2012-2015

2012				
Region	Total Population	under 5 Population	Anticipated Pneumonia cases/year	Cotrimoxazole 120 mg tablets requirement/year (Dispersible)
Addis Ababa	3,038,096	217,528	76,135	114,202
Afar	1,573,294	158,273	55,396	83,093
Amhara	18,727,852	2,535,751	887,513	1,331,269
Benshangul Gumuz	777,696	125,831	44,041	66,061
Dire Dawa	387,877	47,088	16,481	24,721
Gambella	375,209	50,728	17,755	26,632
Hareri	208,451	26,848	9,397	14,095
Oromia	31,331,572	5,147,777	1,801,722	2,702,583
SNNPR	17,353,928	2,708,948	948,132	1,422,198
Somali	5,047,035	885,000	309,750	464,625
Tigray	4,881,411	712,198	249,269	373,904
Total	83,702,421	12,615,970	4,415,590	6,623,384
Wastage 5%				331,169
Cost (USD)				61,200
Total Cost for Pneumonia Medicines (USD)				61,200

2013				
Region	Total Population	under 5 Population	Anticipated Pneumonia cases/year	Cotrimoxazole 120 mg tablets requirement/year (Dispersible)
Addis Ababa	3,092,782	221,444	77,505	627,792
Afar	1,601,613	161,122	56,393	456,781
Amhara	19,064,953	2,581,395	903,488	7,318,253
Benshangul Gumuz	791,695	128,096	44,834	363,152
Dire Dawa	394,859	47,936	16,777	135,897
Gambella	381,963	51,641	18,074	146,403
Hareri	212,203	27,331	9,566	77,484
Oromia	31,895,540	5,240,437	1,834,153	14,856,639
SNNPR	17,666,299	2,757,709	965,198	7,818,105
Somali	5,137,882	900,930	315,326	2,554,137
Tigray	4,969,276	725,018	253,756	2,055,425
Total	85,209,065	12,843,057	4,495,070	36,410,068
Wastage 5%				1,820,503
Cost (USD)				336,429
Total Cost for Pneumonia Medicines (USD)				336,429

2014				
Region	Total Population	under 5 Population	Anticipated Pneumonia cases/year	Cotrimoxazole 120 mg tablets requirement/year (Dispersible)
Addis Ababa	3,148,452	225,429	78,900	1,136,165
Afar	1,630,442	164,022	57,408	826,671
Amhara	19,408,122	2,627,860	919,751	13,244,412
Benshangul Gumuz	805,945	130,402	45,641	657,224
Dire Dawa	401,966	48,798	17,079	245,944
Gambella	388,838	52,571	18,400	264,956
Hareri	216,023	27,823	9,738	140,229
Oromia	32,469,660	5,334,765	1,867,168	26,887,215
SNNPR	17,984,292	2,807,348	982,572	14,149,033
Somali	5,230,363	917,147	321,001	4,622,420
Tigray	5,058,723	738,068	258,324	3,719,862
Total	86,742,828	13,074,232	4,575,981	65,894,132
Wastage 5%				3,294,707
Cost (USD)				608,862
Total Cost for Pneumonia Medicines (USD)				608,862

2015				
Region	Total Population	under 5 Population	Anticipated Pneumonia cases/year	Cotrimoxazole 120 mg tablets requirement/year (Dispersible)
Addis Ababa	3,205,124	229,487	80,321	1,686,731
Afar	1,659,790	166,975	58,441	1,227,263
Amhara	19,757,469	2,675,161	936,306	19,662,434
Benshangul Gumuz	820,452	132,749	46,462	975,705
Dire Dawa	409,202	49,677	17,387	365,124
Gambella	395,837	53,517	18,731	393,349
Hareri	219,911	28,324	9,913	208,182
Oromia	33,054,114	5,430,791	1,900,777	39,916,311
SNNPR	18,308,009	2,857,880	1,000,258	21,005,419
Somali	5,324,510	933,655	326,779	6,862,367
Tigray	5,149,780	751,353	262,974	5,522,445
Total	88,304,199	13,309,569	4,658,349	97,825,330
Wastage 5%				4,891,266
Cost (USD)				903,906
Total Cost for Pneumonia Medicines (USD)				903,906

Annex 6: Quantification for Malaria Treatment from 2012-2015

2012									
Region	Total Population	under 5 Population	Anticipated febrile cases/year	RDT requirement/year (# of Tests)	ACT 6x1 requirement/year (# of treatment doses)	ACT 6x2 requirement /year (# of treatment doses)	Chloroquine 50mg/5ml Syrup requirement (# of bottles)	Chloroquine tablets 250 mg requirement (# of tablets)	Paracetamol tablets 100mg requirement (# tablets)
Addis Ababa	3,038,096	217,528	-	-	-	-	-	-	-
Afar	1,573,294	158,273	189,927.6	189,928	15,954	29,629	17,018	53,484	759,710
Amhara	18,727,852	2,535,751	3,042,901.2	3,042,901	255,604	474,693	272,644	856,881	12,171,605
Benshangul									
Gumuz	777,696	125,831	150,997.2	150,997	12,684	23,556	13,529	42,521	603,989
Dire Dawa	387,877	47,088	56,505.6	56,506	4,746	8,815	5,063	15,912	226,022
Gambella	375,209	50,728	60,873.6	60,874	5,113	9,496	5,454	17,142	243,494
Hareri	208,451	26,848	32,217.6	32,218	2,706	5,026	2,887	9,072	128,870
Oromia	31,331,572	5,147,777	6,177,332.4	6,177,332	518,896	963,664	553,489	1,739,537	24,709,330
SNNPR	17,353,928	2,708,948	3,250,737.6	3,250,738	273,062	507,115	291,266	915,408	13,002,950
Somali	5,047,035	885,000	1,062,000.0	1,062,000	89,208	165,672	95,155	299,059	4,248,000
Tigray	4,881,411	712,198	854,637.6	854,638	71,790	133,323	76,576	240,666	3,418,550
Total	83,702,421	12,615,970	14,878,130	14,878,130	124,976	232,099	133,308	418,968	5,951,252
Wastage 5 %				743,907	6,249	11,605	6,665	20,948	297,563
Cost (USD)				10,466,765	47,241	175,467	46,191	4,531	35,743
Total cost for Malaria Medicines (USD)					10,775,938				

2013									
Region	Total Population	under 5 Population	Anticipated febrile cases/year	RDT requirement/year (# of Tests)	ACT 6x1 requirement/year (# of treatment doses)	ACT 6x2 requirement/year (# of treatment doses)	Chloroquine 50mg/5ml Syrup requirement (# of bottles)	Chloroquine tablets 250 mg requirement (# of tablets)	Paracetamol tablets 100mg requirement (# tablets)
Addis Ababa	3,092,782	221,444	-	-	-	-	-	-	-
Afar	1,601,613	161,122	193,346.3	193,346	16,241	30,162	17,324	54,446	773,385
Amhara	19,064,953	2,581,395	3,097,673.4	3,097,673	260,205	483,237	277,552	872,305	12,390,694
Benshangul									
Gumuz	791,695	128,096	153,715.1	153,715	12,912	23,980	13,773	43,286	614,861
Dire Dawa	394,859	47,936	57,522.7	57,523	4,832	8,974	5,154	16,198	230,091
Gambella	381,963	51,641	61,969.3	61,969	5,205	9,667	5,552	17,451	247,877
Hareri	212,203	27,331	32,797.5	32,798	2,755	5,116	2,939	9,236	131,190
Oromia	31,895,540	5,240,437	6,288,524.4	6,288,524	528,236	981,010	563,452	1,770,848	25,154,098
SNNPR	17,666,299	2,757,709	3,309,250.9	3,309,251	277,977	516,243	296,509	931,885	13,237,004
Somali	5,137,882	900,930	1,081,116.0	1,081,116	90,814	168,654	96,868	304,442	4,324,464
Tigray	4,969,276	725,018	870,021.1	870,021	73,082	135,723	77,954	244,998	3,480,084
Total	85,209,065	12,843,057	15,145,937	15,145,937	508,903	945,106	542,830	1,706,038	24,233,499
Wastage 5 %				757,297	25,445	47,255	27,142	85,302	1,211,675
Cost (USD)				10,655,167	192,366	714,500	188,091	18,451	145,546
Total cost for Malaria Medicines (USD)					11,914,120				

2014									
Region	Total Population	under 5 Population	Anticipated febrile cases/year	RDT requirement/year (# of Tests)	ACT 6x1 requirement/year (# of treatment doses)	ACT 6x2 requirement/year (# of treatment doses)	Chloroquine 50mg/5ml Syrup requirement (# of bottles)	Chloroquine tablets 250 mg requirement (# of tablets)	Paracetamol tablets 100mg requirement (# tablets)
Addis Ababa	3,148,452	225,429	-	-	-	-	-	-	-
Afar	1,630,442	164,022	196,826.5	196,827	16,533	30,705	17,636	55,426	787,306
Amhara	19,408,122	2,627,860	3,153,431.5	3,153,432	264,888	491,935	282,547	888,006	12,613,726
Benshangul									
Gumuz	805,945	130,402	156,482.0	156,482	13,144	24,411	14,021	44,065	625,928
Dire Dawa	401,966	48,798	58,558.1	58,558	4,919	9,135	5,247	16,490	234,232
Gambella	388,838	52,571	63,084.8	63,085	5,299	9,841	5,652	17,765	252,339
Hareri	216,023	27,823	33,387.9	33,388	2,805	5,209	2,992	9,402	133,551
Oromia	32,469,660	5,334,765	6,401,717.8	6,401,718	537,744	998,668	573,594	1,802,724	25,606,871
SNNPR	17,984,292	2,807,348	3,368,817.4	3,368,817	282,981	525,536	301,846	948,659	13,475,270
Somali	5,230,363	917,147	1,100,576.1	1,100,576	92,448	171,690	98,612	309,922	4,402,304
Tigray	5,058,723	738,068	885,681.5	885,681	74,397	138,166	79,357	249,408	3,542,726
Total	86,742,828	13,074,232	15,418,564	15,418,564	906,612	1,683,707	967,052	3,039,307	43,171,978
Wastage 5 %				770,928	45,331	84,185	48,353	151,965	2,158,599
Cost (USD)				10,846,959	342,699	1,272,883	335,084	32,870	259,291
Total cost for Malaria Medicines (USD)					13,089,786				

2015									
Region	Total Population	under 5 Population	Anticipated febrile cases/year	RDT requirement/year (# of Tests)	ACT 6x1 requirement/year (# of treatment doses)	ACT 6x2 requirement/year (# of treatment doses)	Chloroquine 50mg/5ml Syrup requirement (# of bottles)	Chloroquine tablets 250 mg requirement (# of tablets)	Paracetamol tablets 100mg requirement (# tablets)
Addis Ababa	3,205,124	229,487	-	-	-	-	-	-	-
Afar	1,659,790	166,975	200,369.4	200,369	16,831	31,258	17,953	56,424	801,478
Amhara	19,757,469	2,675,161	3,210,193.3	3,210,193	269,656	500,790	287,633	903,990	12,840,773
Benshangul									
Gumuz	820,452	132,749	159,298.7	159,299	13,381	24,851	14,273	44,859	637,195
Dire Dawa	409,202	49,677	59,612.2	59,612	5,007	9,299	5,341	16,787	238,449
Gambella	395,837	53,517	64,220.3	64,220	5,395	10,018	5,754	18,084	256,881
Hareri	219,911	28,324	33,988.9	33,989	2,855	5,302	3,045	9,571	135,955
Oromia	33,054,114	5,430,791	6,516,948.7	6,516,949	547,424	1,016,644	583,919	1,835,173	26,067,795
SNNPR	18,308,009	2,857,880	3,429,456.1	3,429,456	288,074	534,995	307,279	965,735	13,717,824
Somali	5,324,510	933,655	1,120,386.5	1,120,386	94,112	174,780	100,387	315,501	4,481,546
Tigray	5,149,780	751,353	901,623.7	901,624	75,736	140,653	80,785	253,897	3,606,495
Total	88,304,199	13,309,569	15,696,098	15,696,098	1,318,472	2,448,591	1,406,370	4,420,021	62,784,391
Wastage5 %				784,805	65,924	122,430	70,319	221,001	3,139,220
Cost (USD)				11,042,205	498,382	1,851,135	487,307	47,803	377,083
Total cost for Malaria Medicines (USD)					14,303,915				