

Water Supply and Health: Drinking water and Sanitation Coverage in Ethiopia 1990 - 2015 Review

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Abstract— Background: Human health, incorporating physical, social and psychological well-being, depends on an adequate supply of potable water and a safe environment sections. Waterborne infections are one of the commonest problems in developing countries. Access to safe drinking water and basic sanitation needs will eliminate vast part of water-borne disease cases.

Objectives: to assess the trends safe water coverage and sanitary conditions in Ethiopia together with the challenges of the sector.

Methods: In depth literature survey from online published peer reviewed articles, publications from international organization and Ethiopia ministry of health was used to assess the trend and access of improved water and sanitation coverage since 1990 to 2015 in Ethiopia.

Results: Among 93 articles, 45 of them have important information and included in the quantitative review. To this end Ethiopia has reached the Millennium Development goal of access to safe water and the national coverage reached to 68.5% and 33% for sanitation facilities. Ethiopia is not on the right track to reach for sanitation target (47%) of 2015. The development trend for water coverage and sanitation facilities shows that urban dwellers (16% of the population) are more benefited than the rural (84%) citizens. Poor access of sanitation and improved drinking water in rural part is resulted due to improper planning, malfunction water scheme utilities, and other factors.

Conclusions: Despite, the efforts made to increase the access to safe drinking water and sanitation facilities to the population in the last 15 years; water related diseases are still one of the top ten diseases in the country. Protecting the source alone is not sufficient enough to reduce waterborne diseases unless point of use treatments and hygienic handling of water is practiced. Additional commitments and efforts are required post 2015 to assure the sustainability, access to the basic human right, water.

Keywords— Ethiopia, Sanitation, Drinking water supply, waterborne diseases.

I. INTRODUCTION

Ethiopia located in the Horn of Africa between 3° and 15° North latitude, 33° and 48° East longitude. Population of Ethiopia is estimated at 98 Million within its area of 1.13 million square kilometer. 83 per cent of the population lives in rural areas (1). Ethiopia has a large water resources potential which includes eleven major lakes with a total area of 7,400 Km² twelve river basins with a total annual surface runoff of about 110 billion m and ground water with an estimated capacity of 2.56 billion m³(2).

Water is a basic need in sustaining life. A safe, reliable, affordable, and easily accessible water supply is essential for good health. The World Health Organization (WHO) and UNICEF Joint Monitoring Program currently estimates that 1.1 billion people (17 per cent of the global population) lack access to water resources (defined as the availability of at least 20 liters of water per person per day from an improved water source within a distance of 1 kilo meter). Similarly, in Ethiopia majority of the citizens has unable to get an access to quantity and quality of potable water. According to the report of UN-WATER/WWAP in 2004, relatively urban areas receive better water and sanitation service than rural. 65 percent of urban areas (excluding Addis Ababa) and 15 percent of rural areas has got potable water supply. Sewerage service is provided to a very a limited extent in Ethiopia. Millions of cases of illness associated with the lack of access to clean water and sanitation facilities have been diagnosed. Even though, many other illnesses are undiagnosed and unreported about 60-80% of total health problems are associated due to infectious communicable diseases and nutritional problems. To alleviate the problem, efforts have been made by the Federal government of Ethiopia since the 1990s, emphasizing to pervasive poverty reduction and ensuring human development in the country. This vision is explicitly incorporated in various government development policy documents. This review focuses on trends of access safe water coverage and sanitary conditions in Ethiopia together with the challenges of the sector.

II. METHODS OF DATA REVIEW

In order to compile the review, data used in this paper were obtained from different information sources: international and national journal articles and reports, web-based statistics, and fact sheets. Additionally both online and hand search methods were used to gather the information. A review of drinking water and sanitation studies from published articles in English between 1991 and 2015 was conducted. The title and abstract of articles were reviewed, and the full text was retrieved if the abstract suggested the article contained data on drinking water access and sanitation facilities. In total, 130 citations were retrieved and 93 relevant articles were identified after screening the title and abstract. The full text of these was reviewed. Of the 93 articles, 45 were included in the quantitative review and 47 were excluded, either because they contained no data or duplicate data or did not fulfill the selection criteria.

Water related policies and Strategies of Ethiopia: The water supply and sanitation policy in Ethiopia designed to enhance the well-being and productivity of the people through provision of adequate, reliable and clean water supply and sanitation services and to foster its tangible contribution to the economy by providing water supply services that meet the livestock, industry and other water users demands. Moreover, the health policy of Ethiopia outlined the importance of establishing community based hygiene education promotion; advocating and promote the availability of excreta disposal facilities at household level and develop a latrine culture for the overall integrated waste management system (3).

Water and Sanitation nexus the Millennium Development Goals (MDGs): Although more than 1 in 10 people will still lack access to a safe water supply in 2015, the world appears to be on track to meet the overall water supply MDG. The same is not true for the sanitation MDG. The failure to provide safe drinking water and adequate sanitation services to all people is perhaps the greatest development failure of the 20th century. The consequence of this failure is the high rate of mortality among young children from preventable water-related diseases (4).

One of the MDG targets within the environmental sustainability goals calls for halving the proportion of people without sustainable access to safe drinking water and basic sanitation in 2015. Access to water and sanitation is also essential to the health and nutrition goals, as well as to education (by reducing the time spent on household tasks such as collecting water, by improving quality of school

facilities) and female empowerment (e.g. by freeing up women's time otherwise devoted to fetching water).

Achieving the MDG sanitation goal must include provision of wastewater collection and treatment facilities. Increasing access to improved sanitation could otherwise have the unintended negative impact of delivering more untreated wastewater to receiving water bodies, further degrading downstream water quality (4).

Among the wide range water related problems, the failure to provide the most basic water services for billions of people and the devastating human health problems associated with that failure has been accounted great burden of health related issues. Access to water and sanitation converges are important parameters to determine the safety of humans.

In Ethiopia, access **for safe water** in rural part is calculated as people having 15 l/ c /d within a 1.5 km radius from protected water supply schemes (PWSS) while in urban it is defined 20 l/ c /d within 0.5 km of PWSS or public tap stand. With respect to Water coverage it is defined as total number of protected water users covered, expressed as % of total population. This is occasionally estimated as follows: a) urban - production of water from existing sources adjusted for hours of service, water loss and system reliability less non-domestic water demand divided by total per capita daily demand and b) rural - estimated as percentage of people that can be supplied with water calculated by multiplying the number of existing functional schemes by average number of users per scheme. Moreover, Access to latrines/toilet facilities is defined as number of households with latrine divided by total number of households (5).

Water-related diseases are typically placed in four classes: waterborne, water-washed, water-based, and water-related insect vectors. The first three are most clearly associated with lack of improved domestic water supply than the other remaining. The continued trend of population growth and rapid urbanization further strains a deteriorating water and sanitation infrastructure. The crisis of growing water scarcity, coupled with the other short- and long-term risks posed by climate change, is a potential threat to health security and equitable service provision. Universal water and sanitation coverage would still be far off in 2015, 605 million people would remain without access to an improved drinking-water source, and 2.4 billion people would be without access to improved sanitation facilities. Given this scenario, billions will remain at risk of WASH-related diseases such as diarrhoea, which in 2011 killed 2 million people and caused 4 billion episodes of illness. In Ethiopia,

about 15% deaths are attributed to inadequate water and sanitation facilities (Fig.1). Since many illnesses are

undiagnosed and unreported, the true extent of water related diseases is unknown (32).

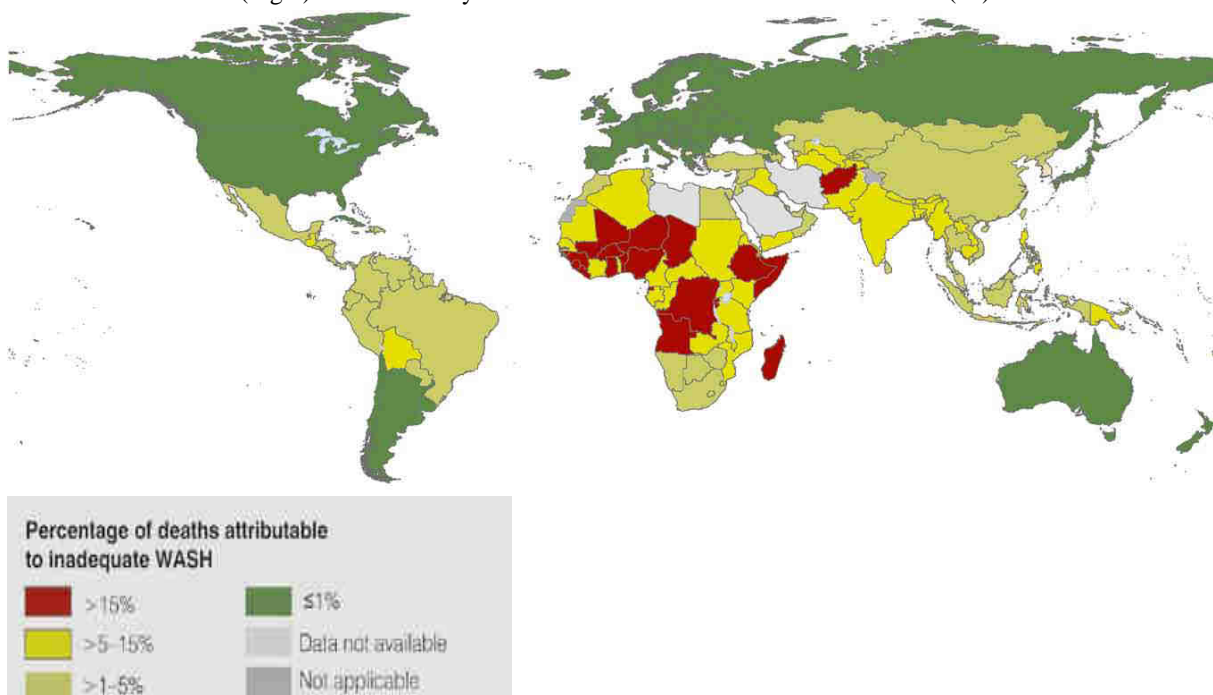


Fig.1:Percentage of deaths attributable to WASH-related disease or injury (33)

Health benefits of improved water supply and adequate sanitation: Although microbial contamination drinking water has decreased in the last 20 years in most developed countries, it often is the most pressing issue in developing countries. It is known that safe water, adequate sanitation, and proper hygiene education (WASH) can prevent illness and death, leading to improved health, poverty reduction, and socio-economic development. Properly managed safe water can substantially prevent water washed and insect-borne diseases. WASH alone can reduce diarrheal prevalence by up to one third. Different levels of access provide widely varying health benefits. Piped water within a household and access to private covered pit latrines significantly reduces the prevalence of diarrhea by 20% (6). In fact as much as 20% of under-5 mortality in Ethiopia can be attributed to diarrhea disease. The disease prevalence has been estimated that a 50% reduction in the incidence of diarrhea can be achieved with the use of latrine, 15% with the use of clean water, and 32% with the practice of hand washing. People with weakened immunity are likely to suffer the most from the lack of safe water supply and sanitation (7).

Global Sanitation and Drinking Water Trends 1990-2015: In 2015, over 91 per cent of the world's population

now has access to improved sources of drinking water. 2.6 billion people have gained access to an improved drinking water source since 1990 of these numbers, 96 per cent of the global urban population uses improved drinking water sources, compared with 84 per cent of the rural population. On other hand, 663 million people still lack improved drinking water sources. Eventhough, 82 per cent of the global urban population, and 51 per cent of the rural population, uses improved sanitation facilities, the world has fallen short on the sanitation target, leaving 2.4 billion without access to improved sanitation facilities (34). A poor water supply impacts human health by causing diarrhoea and non diarrhoeal disease, limiting productivity and the maintenance of personal hygiene (46).

Trends in sanitation and improved Drinking water 1990-2004 EC (1997-2011): On 28 July 2010, the UN General Assembly adopted Resolution 64/292 recognizing that safe and clean drinking water and sanitation is a human right essential to the full enjoyment of life and all other human rights. Citizens have to get of safe and clean water for their wellbeing and survival. In most of developing countries it seems that the resolutions have been ignored for decades putting emphasis towards certain groups ignoring the poor and rural community.

Access to Safe Water: An inadequate water supply prevents good sanitation and hygiene. The share of the population with access to clean water supply has increased dramatically since 1990, Ethiopia reached the MDG target of halving the population without access to clean water by 2015. According to the report of Ministry of health and

water and energy (FDRE), access to safe drinking water increased from 23.1% in 1990 to 68.5% in 2004 EC. Within its limitations (missing data), the overall data has shown that there is an increment of drinking water coverage in Ethiopia in the last 14 years (Fig.2).

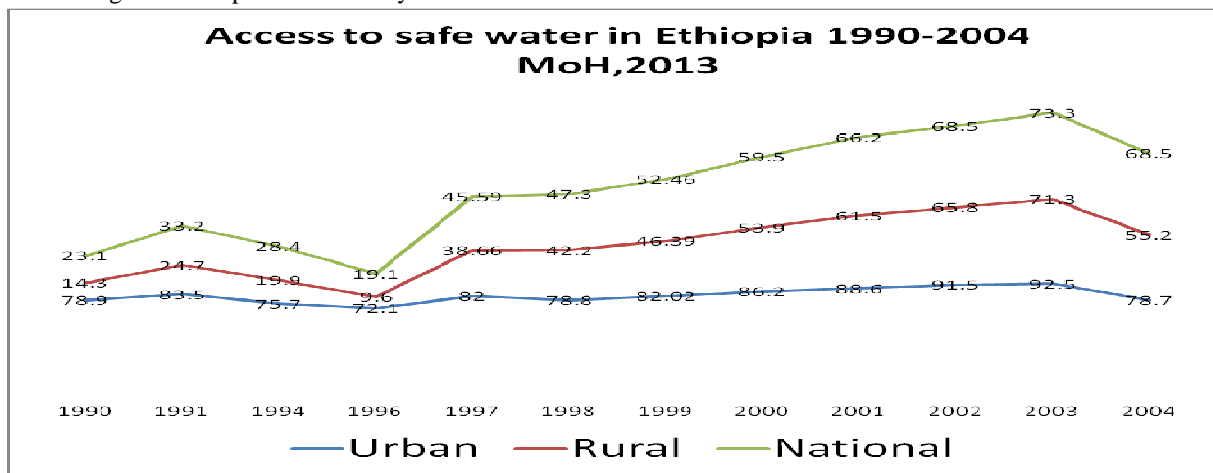


Fig. 2: Trends in access to improved water sources coverage, in Ethiopia (1997-2012 GC). Source; MoH & MoWE, 2013
NB: Water supply access is calculated based on the provision of 20 liter/capita/day for urban, and also 15 l/c/d for rural at radius of 0.5 kilometers, respectively

In most part of Ethiopia the available drinking water has been challenged by different factors like population growth, urbanization. Access of the water should have to be calculated on the bases of the continual availability of within a given period of time than just the length of dry pipe

lines. In some part of Addis Ababa, drinking water is distributed on shifts. The same is true in most regional urban areas of Ethiopia. It will be challenging to answer that how accessibility is determined in the absence of water.

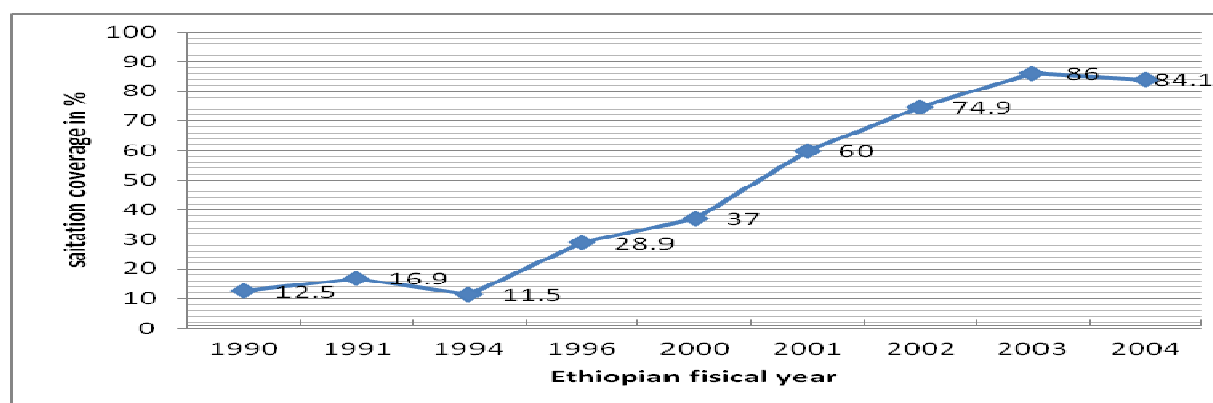


Fig 3: Trends in access to improved sanitation coverage, in Ethiopia (1990-2004 EC) Source; MoH & MoWE, 2013

Majority of Ethiopian citizens (81-85%) are living in rural part, the progress towards access safe water to rural part of Ethiopia (55.2%) is behind the urban population 78.7% in 2004 (Fig:1). This shows that emphasis is given to the small

proportion of the population (urban 15-19%) than the rural part or improper planning activities in the sector. In other words it can be attributed to lack of political commitment, financial allocation and health benefits towards pro poor

policies, strategies. According to the recent update of WHO/UNICEF, report (Table: 1) piped line water premises was not available as the required level 51% of the rural community has access to unimproved source of water for their life activity. It is particularly encouraging to note that the proportion in rural areas with access to clean water has significantly increased from 4% in 1990 to 49% in 2015. In line with this safe drinking water access of the same period increases from 80% to 93% in urban areas for the same period (34).

Additionally, relatively great difference on drinking water coverage estimates on improved source and piped line

premises has been observed in urban dwellers. Almost 93% of urban residents use improve water source on other hand using of unimproved source of drinking water has decreased to 10% in 1990 from 7% in 2015. Because of the great drinking water coverage disparity between the rural and urban population the national coverage of improved water source usage reached 57% still 43% of the total Ethiopian citizen’s relay of unimproved drinking water sources. 51% of the rural population still depends on unimproved drinking water sources for day to day activities (Table 1).

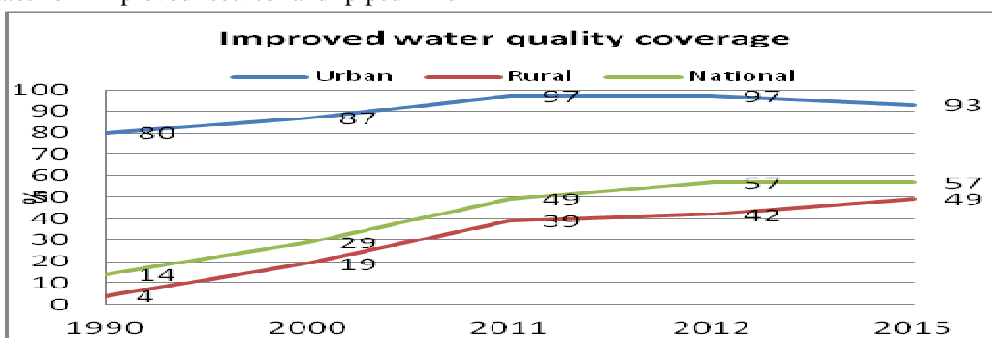


Fig.4: Estimated trends of Use improved drinking water sources in Ethiopia. Source: WHO/UNICEF JMP, 2013, 2014, 2015

Table: 1. Estimated trends of Use of drinking water sources (percentage of population) in Ethiopia

Area	Drinking water sources	1990	2000	2011	2012	2015
Urban	Total improved	80	87	97	97	93
	Piped on primises	90	26	49	51	56
	Other imporved	71	61	48	46	34
	Unimproved	10	7	3	3	6
	Surface water	10	6	0	0	1
Rural	Total improved	4	19	39	42	49
	Piped on primises	0	0	1	1	1
	Other imporved	4	19	38	41	48
	Unimproved	40	40	41	38	35
	Surface water	56	41	20	20	16
National	Total improved	14	29	49	57	57
	Piped on primises	1	4	9	10	12
	Other imporved	13	25	40	42	45
	Unimproved	36	35	34	31	30
	Surface water	50	36	17	17	13

Source: WHO/UNICEF JMP, 2013, 2014, 2015

Close follow ups and capacity buildings on the reliability sustainability and maintenance of water premises should have to be in line with the expansion process to maintain sustainability of the access of drinking water. This means that the type of drinking water sources determination as

improved or unimproved it does not provide information on the quality of the water used, the reliability of water services, or whether people’s sustained access to them is hampered for economic, financial social or environmental reasons. The major problem facing the development of

water supply and sanitation sector is sustainability of the completed water schemes. The reasons for the failure of the schemes are many, which could be categorized in broad terms, as social, institutional, technical, financial and environmental. The current statistics indicate that 20-40 % of the completed water supply schemes are not functional due to the reasons mentioned above (9).

Access to Basic Sanitation: The annual health and health related indicators that has been developed by the Ministry of Health, FDRE, does not give full picture of the sanitation coverage (Table:1). So it is hard to compare the progress trend urban versus rural part of the country. Based on the estimates of WHO/UNICEF JMP 2013-15, indicates that the overall access to basic sanitation in 1990 is low 98%

(Table: 2). In fact, there is an increase of sanitation facilities from 1990 to 2015. Closer to 34% of the rural and 6% of urban population of Ethiopia exercised open defecation in 2015 with an average national percentage of 29%. The figures reveals that access to safe potable water and sanitation cover in rural part of Ethiopia is relatively low (only 28% have got improved facilities in 2015). The health extension program (HEP) and the expansion of education have played there part in the improvement in sanitation services. Accessing improved drinking water source is one that by the nature of its construction adequately protects the source from outside contamination, in particular with fecal matter. An improved sanitation facility is one that hygienically separates human excreta from human contact.

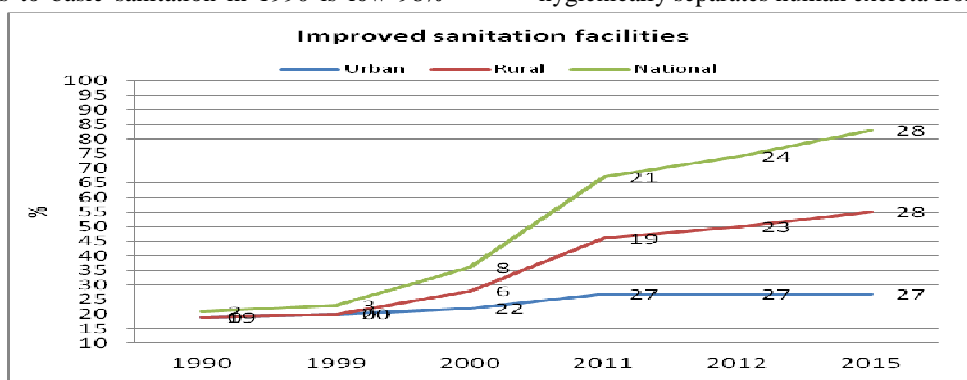


Fig.5: Estimated trends of use of sanitation facilities in Ethiopia Source: WHO/UNICEF JMP, 2013, 2014, 2015

Water should be provided in sufficient quantities to enable proper hygiene at least 20l/c/day/person in urban area or 15l/c/d/p in rural part. Water, sanitation and hygiene improvements can be classified into two groups of related interventions. These are provision of improved water from source to point of use and provision of improved means of excreta disposal, through latrines or connection to the public sewer (10). Public sewer services are available only in Addis Ababa at country level and its coverage to management of waste is less than 10-15%. This very low coverage of proper sewerage disposal might contribute for

the prevalence of water related disease in the city in particular and open defecation to the country in general. Even though much has been done in the last couple of decades to increase sanitation facilities in Ethiopia, According to the reports of WHO/UNICEF (2015), it is only 28% of the total population at national level have access to improved sanitation. Open defecation is still a problem (29%) of the Ethiopian population at national level still exercising open defecation. The problem is much more severe in rural part 34% than the urban area (6%) (Table2).

Table: 2. Estimated trends of use of sanitation facilities (percentage of population) in Ethiopia

Sanitation facilities		1990	1999	2000	2011	2012	2015	
Urban	Improved	19	20	22	27	27	27	
	Un improved	Shared	28	30	34	42	42	40
		Unimproved	12	11	17	23	23	27
		Open defecation	41	39	27	8	8	6
Rural	Improved	0	0	6	19	23	28	
	Un improved	Shared	0	0	2	6	7	8
		Unimproved	0	0	7	22	27	30
		Open defecation	100	100	85	53	43	34

National	Un improved	Improved	2	3	8	21	24	28
		Shared	4	4	7	12	13	14
		Unimproved	1	1	8	22	26	29
		Open defecation	93	92	77	45	37	29
Population (x1000)				48333	65578	84764	91729	98942
% Urban population				13	15	17	17	19

Source: WHO/UNICEF JMP, 2013, 2014, 2015

Current state and trends of water related diseases in Ethiopia:

Since inadequacies in water supply affect health adversely both directly and indirectly, improvements in various aspects of water supply represent important opportunities to enhance public health (46). Utilization of improved water sources to deliver safe and clean drinking-water, do not provide a foolproof perfect guarantee of its safety. To certain extent, the quality of drinking-water from improved sources deviates from the assumption that it is safe. Drinking water quality is normally assessed against both microbial indicators and chemical parameters; the microbial quality is the most important aspect from a public health

perspective. Water quality control is critical in reducing the potential for explosive epidemics, as a contaminated water supply provides one of the most effective pathways for mass transmission of pathogens to a large population. It is important for human health that all water destined for drinking should be of good quality from the point of supply up to the point of consumption (32).

Albeit, many illnesses are undiagnosed and unreported, about 60-80% of total health problems in Ethiopia are associated due to infectious communicable diseases and nutritional problems. In Ethiopia access to improved water sources and sanitation facilities has been increased with their respective proportion in the last 15 years.

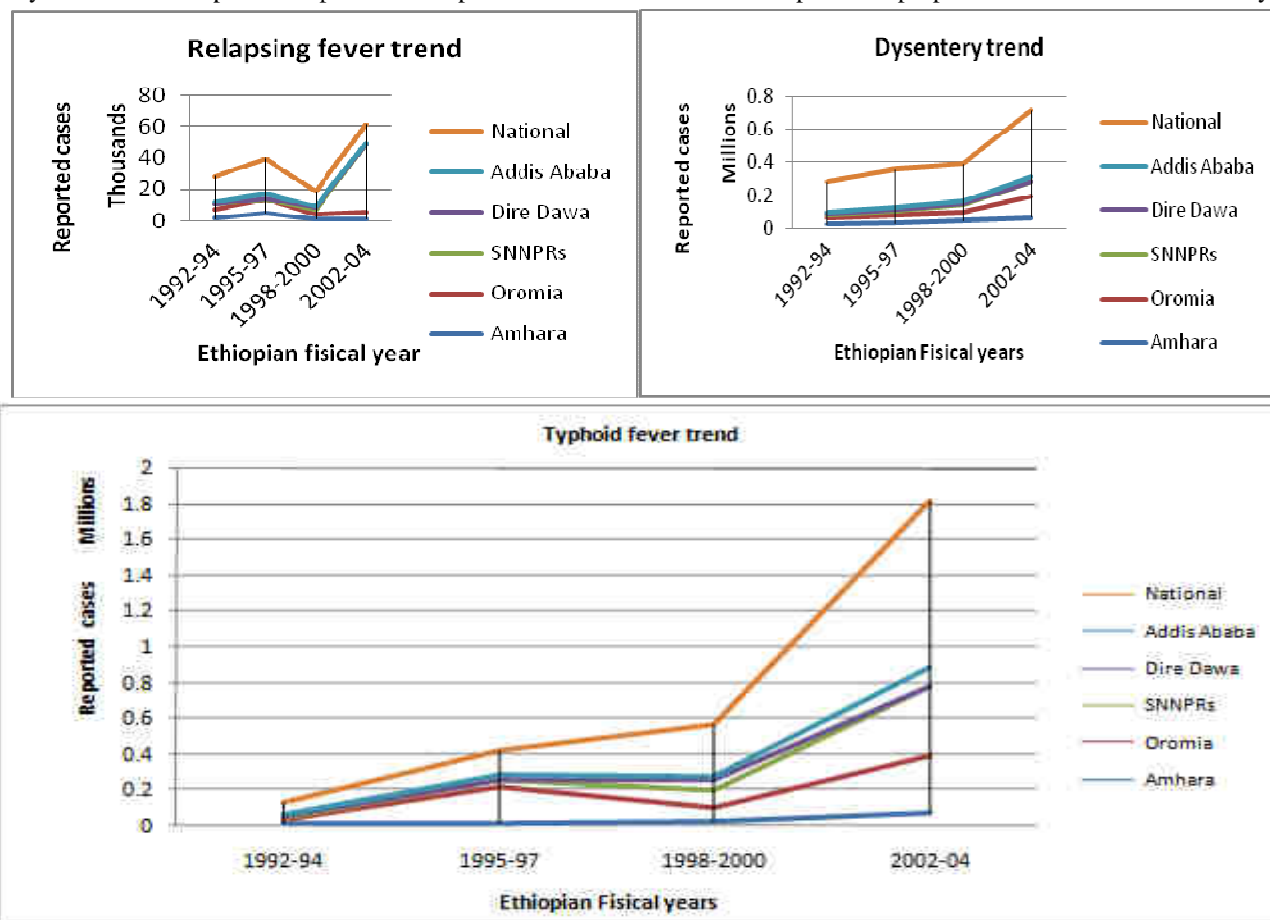


Fig..6:Sum of three consecutive year’s annual water borne outpatient cases reported from 1992 to2004 EC

Mean while water borne disease burden of the society is expected to be reduced in accordance with the improvement of improved water and sanitation facilities. But the data published and obtained from the Ministry of Health (MoH) FDRE, the trend of water related diseases are not showing a decreasing trend. The last 5(five) years (2000-2004 EC) health and health related indicator report shows that 4 (four) of water related diseases has been responsible for about 2, 033, 85 reported cases of inpatient and outpatients (Table: 5). There is comparative increment of diseases from 2000EC to 2004EC or from (2008 to 2012GC). Figure6 shows water related diseases are not declining with the expansion trend of access to safe water and sanitation facilities.

In Ethiopia, water pollution due to fecal matter contamination and poor sanitation practice may be the major cause of the top ten leading causes of outpatient visit, hospital admission and death among children and elderly. Typhoid Fever alone is responsible for 1,205,970 inpatient and outpatient cases throughout the country in the last 5 years. The quality and quantity of water supplied has role in reducing or increasing the possibility of water related diseases. Spot measures of bacterial contamination are not robust measures to assure water safety, some drinking water microbial studies reveled that the microbial quality of improved and or protected drinking water supplies have been proven positive for total coliforms and fecal coliforms. For instance at national level microbial water quality that is used by people have been contaminated from a range

between 14.4% to 87.5%% with fecal coliforms. Specifically drinking water samples from different regions of Ethiopia shows 28.6%-84.3% in Amhara region, 17%-87.5% in Oromia region, 25%-85.7% in Southern Nation Nationalities regional state, 83.3% in Dire Dawa were positive for indicator organism (total coliforms and fecal coliforms) that indicates the possibility drinking water has been contaminated by faces or presence of waterborne pathogen in the tasted samples (Table 3).

Microbial contamination can be highly variable in time and space, and occasional testing can miss important risks. This shows that providing treated or protected water will not be enough to reduce the contamination level rather inadequate volumes of water (quantity) may result poor hygiene practices and therefore water quantity is also important in controlling infectious diarrhoeal diseases. The reduction of morbidity and mortality from infectious diarrhoeal diseases requires improvements in the quality and availability (quantity) of water, excreta disposal and general personal and environmental hygiene. Awareness or health reduction at point of use might be important as of the overall benefit of improved water and sanitation facilities. In general drinking water safety can be ensured only when water supply systems are designed, constructed and managed in a way that minimizes and addresses risks that could cause contamination. Monitoring of water safety should therefore include both water quality testing and risk management measures (33).

Table: 3. Published articles on bacteriological quality of potable water in different regions of Ethiopia

Region	Sample site	Sampling year	sample number	Sampling source	Positive samples for TC/FC	Reference
Amhara	North West	2012	53	Protected Dug well Open spring Open dug well	36.4% 72.8% 63.7%	Tsega et al.,2013
	South Wollo Zone	2012	19		84.3%	Abera et al.,2013
	North Gondar zone	2014	71	Tap, Spring, Well	64.8%	Debasu et al.,2014
	North Gondar	2000	70	Protected spring Protected well Water lines Unprotected springs & wells	35.7% 28.6% 50% 50%	Mengesha et al.,2003
	Bahir Dar Town	2009	70	Tap water Storage container	40% 45.7%	Milkiyas etal.,2011
	Lume & Sirara district	2010/11	233	Household water, rain, spring, borehole	54.9%	Kebede et al.,2014

Oromia	Adama town	2008	107	Pipe water Household container	17% 42.3%	Temesgen & Hameed,2015
	Jimma Zone	2011/12	90	Well, spring (protected & unprotected) Tap water	80% 33.3%	Mohammed et al.,2015
	Jimma zone	2010	24	unprotected well protected well	87.5%	Solomon etal.,2011
SNNPR s	Sidama Zone	2014	21	Protected spring &well	50%	Abebe& Dejene,2015
	Sidama Zone	2011	170	28 functional water points	85.7% TC 25% FC	Israel & Awdenegest, 2012
Dire Dawa.	Dire Dawa town	2011	90	Tap, Spring, well water	83.3%	Desalegn et al.,2013
National	Ethiopian report	2004/5	554	Household piped water Household container	14.6% 56.4%	WHO& UNICEF 2010

Along with improved water supply, proper sanitation and adequate hygiene practices are pivotal for sustaining high water quality and reduce water related diseases. Water pollution does not only have adverse health impacts but it also imposes medical expenses to the population which

does not help fighting urban poverty, besides economic losses; such as time and loss of earnings due to absence from the jobs, missed educational opportunities, official and unofficial health care costs, and the draining of family resources.

Table: 4 Annual inpatient /outpatient national reported Cases 2000-2004Ethiopian fisical year

	Water related Diseases	2000EC	2001EC	2002EC	2003EC	2004EC	Total
		2007/8GC	2008/9GC	2009/10GC	2010/11GC	2011/12GC	
1	Typhoid Fever	126,943	141,120	92,815	326,553	518,539	1,205,970
2	Relapsing Fever	2,842	3,615	2,556	6,868	9,886	25,767
3	Epidemic Typhus	17,231	17,156	20,799	63,197	120,270	238,653
4	Dysentery	78,082	83,934	49,554	142,131	209,767	563,468
	Total	225,098	245,825	165,724	538,749	858,462	2,033,858

Source MOH: Health and Health related Indicators (2000-2004EC)

Because of lack of available data and the presence of other contributing factors, exact calculation of public health implication of lack of potable water and access to sanitation might be tiresome and difficult (31). However, depending on the type of water borne diseases mentioned in Table 4 patients spend considerable amount of money for diagnosis and treatment. For instance, the price of treatment and diagnosis of waterborne disease is relatively cheap in government based health centers than private health centers. By assuming the entire outpatient cases have been treated in government health center, the minimum cost paid by

patients in the last 5 years can be estimated. In a government based health centre facility and pharmacy(at Addis Ababa), patients are expected to pay 12.00 ETB for diagnosis (including registration and lab tests) and from 19.25 ETH birr to 56.40 ETH birr for 10 day medicinal treatment. If we multiply this figure by the total number of typhoid fever cases alone, the country spent between 278,579,070.00 to 816,2004,96.00 million Ethiopian Birr or 12,662,685.00 to 37,100,022.54 million US\$ for the last 5 years. In line with this, on average about 42,685,903.41 million US\$ dollar has been spent (Table 5)

for treatment of typhoid fever, relapsing fever, epidemic typhus, and dysentery between 2000-2004EFY (Ethiopian fiscal years).

It is to be noted that the estimation does not include other economic losses such as time and loss of earnings due to absence from the jobs.

Table: 5. Cost estimation in Ethiopia for treatment and diagnosis of water related diseases

National infection from 2000-2004EFY		Diagnosis price in ETB	Treatment price for 10 days in ETB		
	Infection no		Minimum price	Maximum price	Average price
Typhoid Fever	1,205,970	12	19.25	56.4	37.8
Price for typhoid			278,579,070.00	816,2004,96.00	547,027,992.00
Relapsing Fever	25,767	12	24.4	150.5	87.5
Price RF			905,349,31.20	465,352,02.00	270,553,50.00
Epidemic Typhus	238,653	12	24.4	31	27.7
Price for ET			698,775,98.40	887,789,16.00	793,282,57.20
Dysentery	563,468	6	19	150	84.5
Price for dysentery			642,353,52.00	507,121,200.00	285,678,276.00
Total price in ETH Birr			503,226,951.60	1,458,635,814.00	939,089,875.20
Total price in US\$			22,873,952.30 US\$	66,301,627.90 US\$	42,685,903.41 US\$

NB:- 1US dollar =22 Eth birr, Current 2015 price from Kenema pharmacy at Addis Ababa is used for treatment price calculation.

Without rapid progress in WASH, the growth of national economies will continue to be impeded. Evidence suggests that lack of access to safe drinking-water and adequate sanitation costs countries between 1% and 7% of their annual gross domestic product (GDP). On other hand, a recent study of the economic returns on investments in water supply and sanitation indicated that every US\$1 spent on water supply and sanitation services could lead to an economic return of between \$5 and \$46, with the highest returns in the least-developed areas (46). There for, as it is crucial as disease prevention and economic growth are, the benefits of investing in WASH go beyond health and beyond economic development (32).

support community management (in rural areas) are contributing factors for the limited progress towards universal access to an adequate water supply(46). In short the key challenges of water supply and sanitation might be categorized under institutional, external drivers or local conditions.

Institutional challenges: One of the most significant challenges in the water sector is the apparent lack of reliable, up to date information on coverage, access and use of water. So, to maintain the gains already made; to push ahead quickly to provide drinking water and sanitation services to the billions of people living in rural areas; and to accelerate the successful efforts in urban areas to keep pace with the rising urban population, particularly by focusing on low income and disadvantaged groups basic documented information is necessary (10,11,13). One of the main challenges in measuring safety, sustainability or reliability is the lack of adequate data. Most national monitoring systems do not collect information on these aspects. Where data do exist, they may not be nationally representative or may only cover certain settings Moreover, Non-operating systems, and intermittent or unreliable supplies, place an increased burden on the populations to health risks. The sustainability of improved drinking water sources is often

III. CHALLENGES OF WATER SUPPLY AND SANITATION

A wide range of water problems faces nations and individuals around the world. These problems include international and regional disputes over water, water scarcity, contamination, unsustainable use of groundwater, ecological degradation, and the threat of climate change. high population growth rates, insufficient rates of capital investment, difficulties in appropriately developing local water resources, and the ineffectiveness of institutions mandated to manage water supplies (in urban areas) or to

compromised by a lack of technical skills, equipment or spare parts for operation and maintenance (12).

Across rural Sub-Saharan Africa, an average of 36% of hand pumps is non-operational at any given time, and in some countries, it is estimated that more than 60% of hand pumps are non-operational (13). The reasons for such low levels of rural water supply sustainability are multifaceted and include limited demand, lack of affordability or acceptability among communities, limited sustainability of community management structures, inadequate supply chains for equipment and spare parts, insufficient government support, and environmental issues (14).

External Challenges: There is a considerable funding gap to achieve full coverage; more has to be invested in developing sector capacity through strengthening institutional structures especially at regional, district and community levels. Lack of sustained financing mechanisms for recurrent costs coordination is also observed (8).

Population growth and urbanization: The world's population has been increasing mainly in developing countries. Some countries are failing to increase access to improved drinking water sources in line with population growth. The process of rapid urbanization presents challenges to increasing access to improved drinking water. The growth of informal settlements and poor environmental sanitation hinder efforts to increase access to safe drinking water in urban areas (11).

Climate Change: The main impacts of climate change on humans and the environment occur through water. Climate change is likely to lead to increased water stress, meaning that drinking water requirements will face increasing demand from competing uses of water such as agriculture and industry. An increased prevalence of extreme weather events and climate-related natural disasters could result in an increased loss of functioning drinking water and sanitary facility infrastructures (15, 11).

Social disparities: The gap between the richest and poorest in the use of drinking water sources differs significantly by region and country. Access to improved drinking water sources increases with wealth, and access to piped water on premises is much higher among the richest.

Some report indicates that almost two-thirds of total official development assistance for drinking water and sanitation is targeted to the development of large systems for urban systems than the rural one (16). Far too much money has been spent on centralized, large-scale water systems that cannot be built or maintained with local expertise or resources. Traditional and community-scale water systems have been inadequately funded and supported (4).

The pressure on water resources is growing due to the combined effects of population growth, urbanization, economic development and climate change. This also threatens the sustainability of water supplies. The region's most vulnerable to domestic water shortages include those where access to water is already limited, the population is growing rapidly, urban centers are spreading, and the economy is burdened by financial problems and a lack of skilled workers (11). Progress towards the MDG target on sustainable access to safe drinking water reveals the need for substantial work to continue in order to reduce existing disparities between regions and countries, between urban and rural settings, and between different layers of society. Monitoring the sustainability and safety aspects of water systems and services will need to be further stepped up.

IV. CONCLUSIONS

Waterborne disease transmission will still continue unless we tackle the root causes of these diseases, which are poor access to safe water and basic sanitation. Supplying basic sanitation is neither difficult nor costly, especially in rural areas. Millions of deaths will continue to occur every year from water-related diseases unless far more aggressive actions are taken to meet basic human needs for safe water and sanitation.

The failure to meet basic human needs for water is widely acknowledged to be a major development failure of the 20th century. The price for this failure will be paid by the poorest populations of the world in sickness, lost educational and employment opportunities, and for a staggeringly large number of people, early death. Even if the official United Nations Millennium Goals set for water are met as many as 76 million people will die by 2020 of preventable water-related diseases. This is morally unacceptable in a world that values equity and decency, but at the present time, it appears unavoidable unless we rethink our approach to providing water and sanitation services and redouble international efforts to aid those lacking this most basic of human needs.

The way forward

- The safety, reliability and sustainability of both water supply sources and sanitation facilities should be addressed (Beyond 2015).
- The local and state governments should enhance public sensitization programs on hygiene, sanitation and environmental issues.
- Policies that aim to improve water quality through source improvements may be compromised by post-

collection contamination. Safer household water storage and treatment is recommended

- Implementing water and sanitation services in rural areas can be addressed preferably through community management system.
- Priority should be given to meeting unmet human needs for water rather than other infrastructures
- The data that is produced about potable water supply by MoH and MoW are not consistent or reliable. This might be associated with poor documentation and or absence monitoring and evaluation activities.hence it needs attention for data reliability.

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