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AN ASSESSMENT ON THE STATUS OF WATER SUPPLY AND SANITATION IN ETHIOPIA: A CASE OF AMBO TOWN

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ABSTRACT

This paper analyzes, at the town level, the current water supply and sanitation system and their management of service delivery. The study focuses on the Ambo town status on water supply and sanitation and their board's multi-dimensions challenges therein. This town has a predominance of residential users' whose need ranges from the primary role of services' provision to community health due to the incidence of waterborne diseases. The empirical findings revealed that when services are being provided, there is a stark need to improve the service levels from the financial and technical matters to administrative matters to complement the changing local situations. The rapid urbanization in small and medium towns in the regional development of Ethiopia has to match their future requirements through sustainable resources and strategic interventions in service delivery management.

Keywords*: Water Supply and Sanitation (WSS); Waste Disposal; Urban Towns; Service Provision and Coverage; Incidence of Water Borne Diseases*

BACKGROUND OF THE STUDY

In Ethiopia, the water supply service level, in terms of coverage quantity and quality, is very low due to factors like topography, sources of water reserve, distribution systems, treatment plants, and community health centers. The same is true in the case of poor sanitation facilities. Sanitation methods are dry sanitation practices, poor sewage systems, low septic tank provisions, and poor storm water drain systems. Due to its unreliability and non-sustainable nature, the existing service level in different parts of Ethiopia is lesser than the required levels. That is to say improved sanitation methods are required which is also expectations' of residents. The poor water supply and sanitation facilities, along with other infrastructure services, bear a high level of impact on national and regional development, inclusive of both urban and rural communities. The Ethiopian government's efforts on implementing a water sector development program are based on the national resource management policy. The national water resource sector strategy is a part of the water sector development program. The government receives a credit or grant for the urban water supply and sanitation (UWSS) component of the project. At the regional level, the Water Resource Bureau of the Oromia Regional State (OWRS) is engaged in planning, distributing, operating, maintenance, monitoring, and evaluating urban water supply and sanitation projects. Initially, there were scattered efforts in Water Supply and Sanitation to improve the provision of clean and adequate water supply and sanitation facilities, yet their coverage remains low and inadequate. Therefore, the

comprehensive planned efforts will improve the overall situation if it is properly implemented by all regions simultaneously in Ethiopia and supported by the woreda and kebelle, at local levels in all the regions. This study attempts to understand the status, progress, and challenges ahead in Ambo Town Water Supply and Sewerage Enterprise within its domain of operation.

STATEMENT OF THE PROBLEM

Due to the lack of safe water supply systems, poor sanitation is leading to the spread of diseases and death in Sub-Saharan African countries, like Ethiopia. Therefore, it is required that the administrative institutions at the national, regional, zonal, and local levels address issues on administrative, financial, and technical fronts endorse a consistent with a balanced approach. The institutions performing these functions like adequate and safe drinking water for everyone and more so the weak and vulnerable seems an undulating and uphill task. Lack of an improved outreach by these institutions means the weak and vulnerable at the periphery are more prone to disease and death. An instance is where high child mortality rates among the vulnerable communities will be delayed in reducing their at each of the household level HH level. In Ethiopia, those urban poor aspiring to use basic facilities with decent living standards are facing problems, like poor shelter, poor water supply, and poor sanitation. Their aspiration is sufficed by only defective or inadequate facilities to maintain decent standards of living, which depicts the intensity of urban poverty along with inadequate institutional capacity in Sub-Saharan Africa. Ethiopia has untapped water resources, like major river basins, large lakes, and numerous wells and springs. Tapping the water resources is a challenge, due to constraints like financial and technical reasons. Inadequate, as well as lack of toilet facilities and inappropriate waste disposal facilities, heavily influenced the spread of diseases and they have become prone to pollution risks. These dynamics affected by rapid urban growth and spatial expansion of cities and towns in Ethiopia, which resulted in undesirable consequences on the already slim WSS infrastructure and reflects on operations and maintenance of their sublime service levels. Few delays, staggered or partial attempts, or sometimes improperly addressed issues by the authorities at the local or regional levels is a residue constant due to several constraints. This is the position in most of the small and medium towns in Ethiopia, and perhaps the metropolis, like Addis Ababa. The small town, Ambo in the Oromia region, has shown rapid expansion and growth since 1885 in its areal spread and a rapid increase in population size. This spatial expansion and economic and social growth necessitates a suitable action plan to improve their urban infrastructure with a focus on water and sanitation facilities. In response to such imbalances, the town planning, administration, and their stake holders' efforts require a strategic intervention on their technical services. This study focuses on the related questions, such as the extent and quality of water and sanitation services, customer's satisfaction, community health and environment protection, community participation in improving their coverage, and quality.

OBJECTIVES OF THE STUDY

The statement of problems highlight on infrastructure in Ethiopia, like other Sub-Saharan African developing countries, with special reference in the water and sanitation sector. This study generally analyzes the situation in the Ambo town and their WSS provisions.

The specific objectives are as follows:

- To identify the role by Ambo Town Water Board and Ambo municipality in providing the provision of water and sanitation service;
- To examine the existing water and sanitation service scenario in Ambo town;

- To reveal unfavorable influences on service levels, resulting inadequacy on the entire development of the town; and
- To indicate community health problems of the residents due to water and sanitation practices.

RESEARCH METHODOLOGY

This study uses the cross sectional survey design to account for the town's level of institutional structure, practices, and their service delivery management. The WSS service provision in Ambo is the responsibility of the Ambo Water and Sanitation Enterprise (AWSSE). The sources for analytical methods include primary and secondary sources to collect their information. Ambo zone is having urban and rural components. Ambo town proper is having 5 units / kebelles or urban segment and peripheral rural areas on the ridge use the service facilities, were considered as strata. So a stratified simple random sample of fifty is taken to include urban units as well as rural units which are at the periphery and depend on the agency service. Another tool that was used was an interview with the officials and experts in the concerned government bureau to acquire organizational information on WSS. The non-participant observation tool was used for field visits to the treatment plants. The secondary data collected information using the library, from related websites, government reports, and annual reports.

WATER AND SANITATION PROFILE OF ETHIOPIA

The five sources of water in Ethiopia are briefly discussed here in the Table 2, which were identified in this survey as own tap, public tap (bono), protected well/spring, unprotected well/spring, and river or lakes.

Table 2: Drinking Water Sources in Ethiopia

Source	Surveyed years			
	1996	1998	2002	2004
a. River or lakes	48.2	43.5	33.9	27.9
b. Unprotected wells / springs	19.0	28.2	38.1	36.1
Unsafe water	***67.2***	***71.7***	***72.0***	***63.9***
a. Protected well / springs	5.5	10.2	11.1	12.9
b. Public tap	11.4	10.8	13.5	18.8
c. Own tap	2.2	2.7	3.3	4.2
Safe water	19.1	23.7	27.6	35.9

Source- Welfare Monitoring Survey Report 2006

The first three are assumed to supply safe water, while the last two are classified as unsafe sources of water. Most of the households (HH) (63.9 percent) use unclean drinking water comprising from the river or lake (27.8 percent) and other HHs fetch water from protected well/spring (36.1 percent). The HHs with access to safe water account for 35.9%, which constitutes 12.9 % of HHs that use water from protected well or springs, 18.8 % from public top, and 4.2% HHs that have their own tap.

Table 3: Drinking Water Sources in Rural and Urban Ethiopia

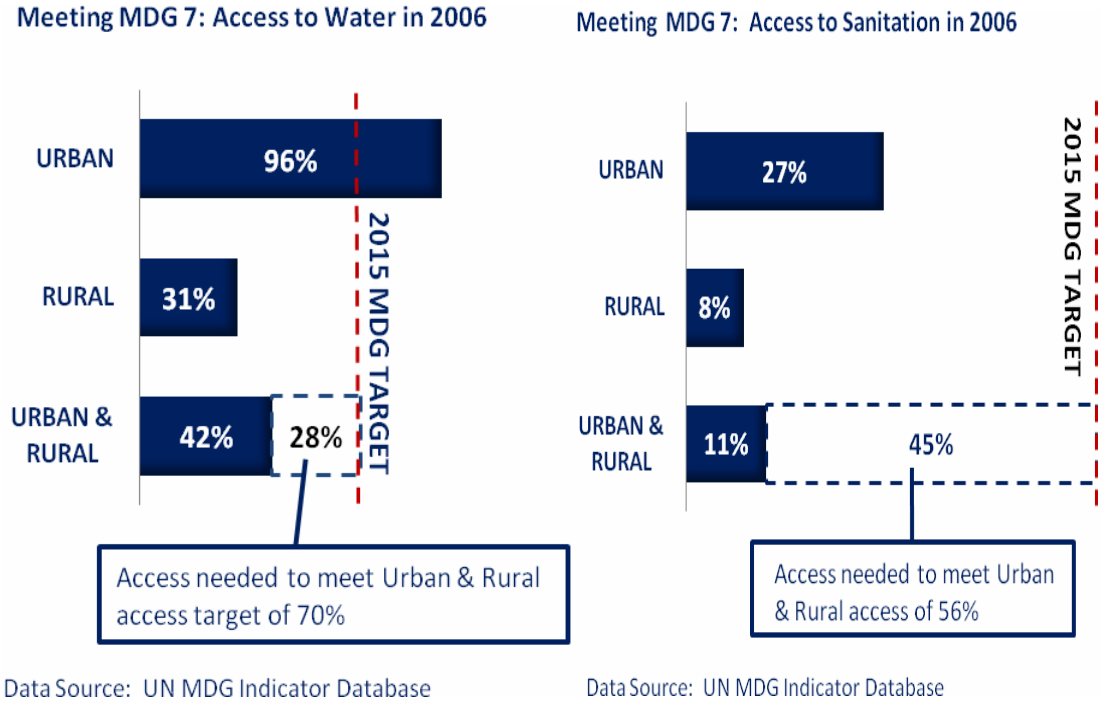
Source	Surveyed years			
	1996	1998	2002	2004
Rural Ethiopia				
a. River or lakes	53.6	49.5	38.9	32.4
b. Unprotected wells / springs	21.5	32.2	43.9	42.1
Unsafe water	***75.1***	***81.7***	***82.8***	***74.5***
a. Protected well / springs	5.3	10.1	11.6	14.4
b. Public tap	4.2	3.6	5.3	10.4
c. Own tap	0.1	0.0	0.2	10.2
Safe water	**9.6**	**13.7**	**17.1**	**0.6**
Urban Ethiopia				
a. River or lakes	18.1	7.0	4.5	3.1
b. Unprotected wells / springs	5.0	4.1	3.7	4.5
Unsafe water	***23.1***	***11.1***	***8.2***	***7.6***
a. Protected well / springs	6.4	10.1	7.9	4.7
b. Public tap	51.4	54.1	62.1	64.4
c. Own tap	14.3	18.8	21.7	23.3
Safe water	**72.1**	**83.5**	**91.7**	**92.4**

Source- Welfare Monitoring Survey Report 2006

Table 3 discusses the severity of the problems among rural HHs. About 74.5% of rural HHs, in 2004, experience poor water provision. This means 92.4% of urban HHs had access to safe water and only 25.2% in rural areas enjoyed this service provision in 2004. In rural areas, the sources of drinking water for 32.4% of the HHs are rivers and lakes. About 42.1% in 2004 are also found to use an unprotected well or spring as their source of drinking water. Among the rural HHs, 14.4% depend on the protected well/spring and 10.2% on public tap as their source of drinking water. A very negligible proportion of rural HHs (0.6%) in 2004 uses their taps as a source of drinking water. While the urban HHs have better access to safe water, 64.4 % of the HHs use a public tap, 23.3% use their tap, and 4.7 % use a protected well/spring. On the other hand, about 4.5% of urban HHs in 2004 use unsafe drinking water, such as an unprotected well/spring, and 3.1 % in 2004 that fetch water from rivers and lakes.

The two major findings from the table 2 are in both the urban and rural HHs and in Ethiopia, the trend shows an slowly outreach to more HHs, gaining access to safe water from the year 1996 to 2004. Secondly, due to the population increase during this period, still the gap exists between supplying service agencies and their coping mechanisms of these agencies are thrown open to more challenges, like hilly topographic conditions. These statistics from the welfare monitoring survey help to make the comparison between our findings to that of the national level figures.

Figure 1: MDG Goals in Ethiopia in Water and Sanitation, 2006



The Ethiopian government was responsible for identification, planning, and implementation of WSS improvements. Consistent with the policy of decentralization, most of the responsibilities shifted to regional and local governments under the National Water Resources Management Policy and Strategy (NWRMPS). Implementation of these policies and strategies has ultimately fallen on the local service providers with support from the regional offices of Ministry of Environment (MoE) and the Ministry of Health (MoH). Due to the dual nature of the two ministries involvement and also the national and regional directions, the governments made everyone sign a memorandum of understanding water and health functions in 2006.

Sector financing is especially important to meet the Millennium Development Goals (MDGs) targets by 2015. The government, community investments, and donor allocations and commitments were projected at $103 million a year in 2006, leaving a gap of $197 million per year in additional financing required to meet the MDG targets. It is not known whether Ethiopia has the capacity to effectively and efficiently utilize the current available amounts, much less any additional allocations, although additional capacity to absorb new funding is being scaled up through donor coordination. Furthermore, the government needs to involve and legalize local Water and Sanitation committees so that they can leverage the government funding and their revenues with the private investment. The involvement on raising the capital for committees with support of public –private service providers is NWRMPS' requirement. Besides policy also spells out that urban providers are to cover investments and operation and maintenance (O&M), while rural providers cover

O&M costs with some limited cost sharing of large capital outlays. The National Sanitation Strategy has re-focused government strategies on pro-poor, low-cost practices, sanitation promotion, and the leveraging of additional resources, and it requires the local sanitation providers to cover the cost of installing and maintaining sanitation facilities

WSS service has been fully decentralized to towns and local Woreda Water Desks (WWD); however, decentralization has also redistributed vital equipment and staff throughout the rural areas to the extent that the poorer areas now have less access to technical assistance. Although the government has established technical training institutes and is now training adequate personnel, the WSS sector's financing and stock of equipment supplies and services still need improvement. Multiple opportunities exist to support the National Rural Water Supply and Sanitation Program, especially in the local capacity building, legalization of Water and Sanitation committees for borrowing purposes, and facilitating the involvement of the private sector in financing and equipment sales and maintenance.

Recently, greater policy level efforts have been made to enhance the management of the sector and its contribution to socio-economic development. Especially during the first phase of Sustainable Development and Poverty Reduction Program (SDPRP), significant steps have been taken towards improving the overall water resource management towards improving the overall water resource management policy, the water sector strategy, and water the sector development programs. On the basis of these successes and lessons learned, to carry forward the sector policy and strategy developed during the SDPRP, and it was decided under the policy to accelerate the implementation to achieve the MDGs. This policy recognizes that the water resource management refers not only for all purposes, including for power and irrigation, but also networking of the nation's water resources entirely. It is also important to recognize it as it implies the need for substantial collaboration across agencies. Towards this end a recent model is the Nile basin project initiative is a determined effort by the Ethiopian government.

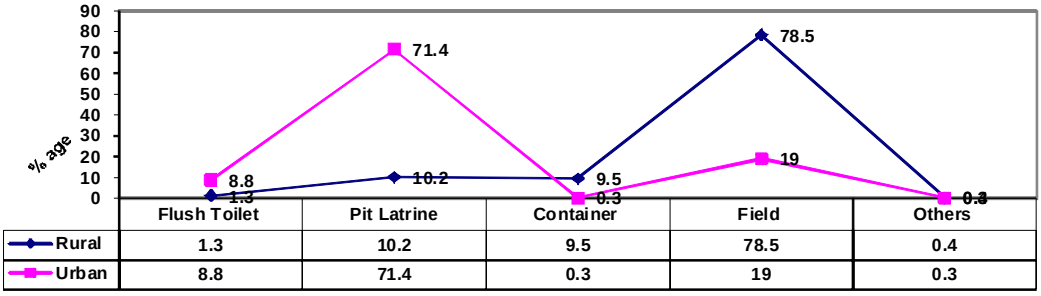
Enshrined under Plan for Accelerated and Sustained Development to End Poverty PASDEP are the main elements of the overall water sector strategy. The policy goal was to provide for clean portable water, promote enhanced irrigation development in an integrated manner to promote economic growth, alleviation of poverty and food insecurity. The national government emphasized on multi purpose development of water resources at different sub-national levels as implementing agencies. Their preference was to use low-cost affordable and labor intensive technologies in water sector. Finally improving the sanitation provision keeping in view the gender consideration and participative opportunities for females was envisaged so as to keep them employed.

Even then, the issues and challenges in the WSS sector are the ongoing operation and maintenance of rural water supply schemes and establishing the financial viability of urban system. The other major issue confronting Ethiopia is how to move beyond the low level of sanitation coverage. To address the problem of operation and maintenance, there is an increasing emphasis on ensuring that the appropriate community management structures are to be in place for routine operations. Even small–scale community financing mechanisms are to be introduced to raise the funds for their maintenance. With respect to the financing of urban schemes, the challenge is to make sure that the operating costs are covered without rural dwellers cross-subsidizing urban dwellers, or excluding the poor from service, and to raise large amounts of finance necessary for long term expansion. Increasingly systems are being managed on the basis of semi-commercial water boards with financial structure and tariff designed to increase long term sustainability. Even as it is

realized that public and donors finances for the major capital investment is going to be needed some time in the future. Finally, strengthening the information base in the water sector is a priority. Even as information monitoring and evaluation system as part of their water supply management information system needs to be established. In the context of sanitation in the PASDEP, it promotes major programs and supports the use of latrines, including through the health extension program efforts. The sanitation target is for increasing rural sanitation coverage from 17.5% to 79.8% and urban sanitation coverage from 50% to 89.4% of population.

One of the indicators on the well being of the HHs welfare was incorporated in the FDRE, the Central Statistical Agency, and the Welfare Monitoring Survey (WMS). This report discusses the availability of standard toilet facilities for HHs, their availability of access to toilet facilities, as well as the toilet type used by HHs. The WMS questionnaire included four types of toilet facilities, namely flush toilet, pit latrine, container and field/forest. As indicated in the survey, the majorities of HHs (68.9%) do not have toilet facilities and hence use an open field or forest. About 28.1% of the total HHs used a pit latrine. This finding is more of an influence of rural HHs where more than 78% do not have toilet facility. Only 10% of rural HHs have pit latrine. The urban HHs are in a better condition, where 71.4% use pit latrine. Yet a significant proportion of HHs are left without toilets. It will be much more serious to observe that around one-fifth (20% percent 19.2 %) of urban HHs do not have a toilet and are using open field. In the urban areas, the data also indicates that about 71.4 % of the HHs has reported to used pit latrine and 8.8% percent flush toilets, as indicated in figure 2. The data from the four Welfare Monitoring Survey reports indicated that more than 78% of rural HHs and 19 to 42% of urban HHs do not have toilet facilities. Nevertheless, there is a significant improvement toward accruing better toilet facilities. The proportion of HHs that use pit latrine rises consistently in both rural and urban areas, and the proportion that use field forest decreases (with a faster rate in the urban than the rural area) over the four survey years (1996, 1998, 2000, 2004)

Figure 2 Distribution of HHs toilet types



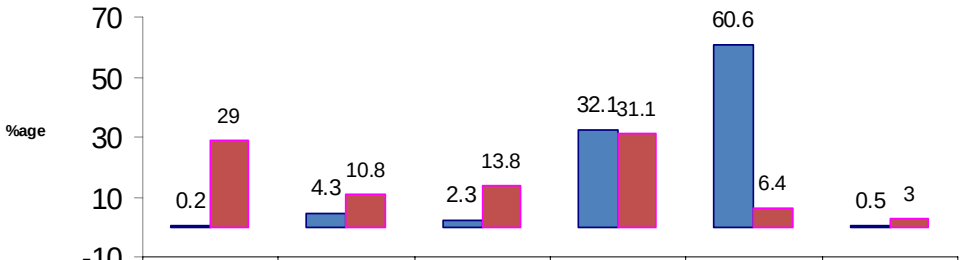
	Flush Toilet	Pit Latrine	Container	Field	Others
Rural	1.3	10.2	9.5	78.5	0.4
Urban	8.8	71.4	0.3	19	0.3

Source: FDRE CSA, Welfare Monitory Survey Analytical Report 339-A Statistical Bulletin, Wastage Disposal, Addis Ababa, June 2004, (pp 130-132)

Improper waste disposal systems have adverse repercussions on environmental sanitation, which would hamper the public health efforts to control disease and pollution. The successive WMS reporting on waste disposal methods observe the extent of sanitation problems. The usual practices to dispose waste include the use of waste disposal vehicles /container, dugouts, throwing away, and using the waste as manure. At the country level, more than half of the total HHs (52.0%) reported that they use the waste as manure fertilizer in their field, they are, by and large, the rural HHs. A substantial proportion (31.9%) of total urban HHs stated that they dispose their waste by just throwing it away. While a

small proportion of HHs has reported to the practice of burning the waste (13.8%) and 29% make an attempt to use disposal container to dispose waste. Among rural HHs, throwing away (32.1%) and using it as manure (60.6%) are the most common rural neighborhood practice. In contrast in urban areas using a waste disposal vehicle/container (29%). The Welfare Monitoring Survey indicates 'throwing away' as a most commonly practiced way of disposing garbage among HHs in both urban and rural areas. It has also identified that 'using garbage as manure' as a common among rural HHs.

Figure 3: - Distribution of HHs waste disposal methods practiced



	Waste Disposal	Dugout	Waste Burning	Throwing away	Use as manure	Others
Rural	0.2	4.3	2.3	32.1	60.6	0.5
Urban	29	10.8	13.8	31.1	6.4	3

Source: FDRE CSA, Welfare Monitory Survey Analytical Report 339-A Statistical Bulletin, Wastage Disposal, Addis Ababa, June 2004, (pp 130-132)]

Another point to be discussed is that the infant mortality rate is 77/1000 on the baseline year 2004/05 and it is expected to be reduced further to 45/1000 in 2009/10 according to PASDEP report.

Water and Sanitation Service in Ambo Town

Ambo town is located in West Showa zone, western part of the Oromia and at a distance of 112 km from Addis Ababa. The inter-zonal road connecting to Nekemte town passes through this Ambo town. The town was established in 1889, covering an area of 1,320 ha. Ambo is one of the oldest towns. Ambo means 'lake', which has salt in it. Even today, it is well known tourist spot attraction for its hot spring called as "AmboTseble". For a short while, this town's name changed to 'Hagre Hiwot' during the Haile Selasse regime, but reverted to its present name in 1975, during the Derge administration. The town municipal administration prepared a master plan in 1931, due to its strategic position of serving as an administrative, commercial, and transportation center of Western Showa. The 2007, the Central Statistical Agency, CSA population of the town is 50,267 and, with the growth rate being 2.5%, its projected population is about 52,845. There is a discrepancy between the CSA and the town administrative results. The geographical location of Ambo town is $08^0$59'N latitude and $37^0$51'E longitude. The average elevation of the town is 2050 meters above sea level; however, it sometimes varies from 2060-2140 m above sea level. The available water sources include ground water and surface water source in and around the town. There are perennial rivers, such as Huluka, Dabbis River, and Aleltu stream, which is seasonal, that flows from northeast to northwest at the boundary of the town and joins into the Gudder river. Huluma and Dabbis rivers are used as a source of water supply for animals, sanitation, and HH uses, such as cooking and making local beverages. The water source is used for drinking purpose during water shortages by the surrounding towns.

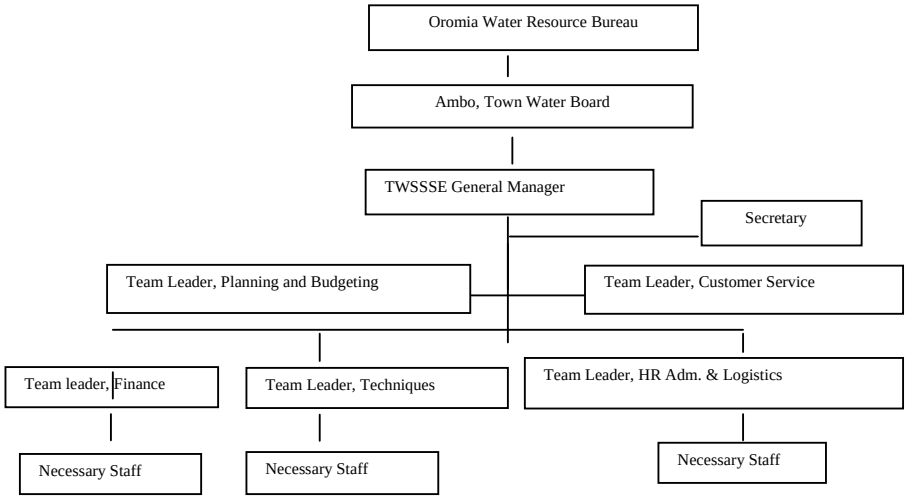
Table 4: Distribution of HHs by source of drinking water of Ambo

Source type	Rural	Urban
a. River or lakes	40%	0
b. Unprotected wells / springs	20%	0
Unsafe water	*60%*	*0*
a. Protected well / springs	20%	4.54%
b. Public tap	0	9.09%
c. Own tap	20%	86.36%
Safe water	**40%**	**100%**

Source: FDRE CSA, Welfare Monitory Survey Analytical Report 339-A Statistical Bulletin, Wastage Disposal, Addis Ababa, June 2006, (pp 130-132)]

The water supply for the town began in 1952 during the Haile Selasse regime for the king residential palace by using a channel. A foreign visitor promised to change the water supply system to pipeline and the plumbers were sent from England and Italy. The first pipeline was laid in 1954 for the Ethiopian Hotel and Ambo College of Agricultural Institute (ACAI), which is known as Ambo University now. Initially, the water meter was not installed and the payment was made by rough estimations. Later on, Poland water meters were installed and payment was made as per the meter reading. The situation transformed after the establishment of the Town Water Bureau, when it attained the status as a separate autonomous government department in 1960.

Figure 4 Organizational setup of the Utility



Source: Own survey

Town Water Bureau, initially, was not functioning well and even residents revolted on their poor style of service provision. As a result, the bureau had to undergo administrative reforms and capacity building efforts. These reforms succeeded in realizing the responsibility by offering portable water to almost all the residents. The vision statement stated that, "To aspire and to see hundred percent of the town gets access to portable and adequate water supply and

improved sanitation service by the year 2015 and the towns water resource tapped, controlled and managed". The mission is to implement policies, laws, and regulations that are related to water resource management provision of portable and sustainable water supply in order to enhance the socio-economic development of the town. Currently, the bureau is implementing business process reengineering that is expected to enhance its responsiveness, efficiency, effectiveness, and entrepreneurial ability. This reengineering process is expected to bring about a desirable change as their goal is promoting and expanding their services. The Oromia National Regional State has enacted a proclamation for the "Establishment of the Office of Urban and Rural Water Supply Services of the Oromia National Regional State", 78/2004, March 2004. It approves towns to establish their own water boards in all zonal administrations of the region. Ambo Town Water Supply and Sanitation Enterprise (TWSSE) is one such enterprise. It provided a legal basis to establish its own Town Water Board. The proclamation elaborates on the structural organization of enterprise and board, and the water board's legal basis, and its powers and duties, including its regular meeting schedule, procedures, responsibility, and accountability of these elected board members. The Ambo TWSSE and Town Water Board were established in 1996.

This existing water source of Ambo town is from the Huluka river intake and the three boreholes. The river intake system started giving service, which is designed for a ten-year period, serving a population of 27,000. The intake system pumps the raw water to the balancing chamber. From the chamber, the raw water flows to the treatment site gravitationally and the clarifier of treatment plant is a square cross section in plan, hopper type with two integral sludge pockets and duo-value self-washing sand filter. The water treatment plant is located in the town itself. The transmission main is 1.526 km, having a 200-diameter DCT pipe. The water supply scheme consisted of: intake line constructed on Huluka river; man hole and drain system for trapping the sand and silt material; wet well and pumping station; rising main to the balancing chamber; graving main to the clarifier; chemical dosing pumps and equipment; up flow clarifier; automatic graving filter; 500m service reservoir; distribution system; operation building; public water points; administration; and store building.

Table 5: Existing water supply sources of town and their discharge

Description	**Depth /meters**	**Year**	**Yield l/s**	**Status**
Huluka River intake	_	1982	16.7	Functional
BH1	100	2001	11	Functional
BH2	100	2002	7	Functional
BH3	100	2008	11	Non started giving service

Source- Ambo Town Water Bureau, 2008.

The water from the Huluka River is taken by a water line constructed along the river's cross section and is of sill type with grid and paved approaches. The water is diverted from the river through a pipe of 400mm and a length of 19.6 m. The water flow will then be collected in a sand trap manhole, which will lead water to wet well and sand and silt back the river. The manhole has two compartments where by the water from the intake flows back to the river through a drainpipe, having a diameter of 200mm. The wet well has a volume of a maximum of $35m^2$. The water to the well is taken by PVC pipe, with a diameter 400mm and length of 30.6 m. The drainpipe is now clogged and is not functioning

any more; even part of the pipe has been taken out from the trench. The raw water pumping station is provided with a wet well pump house and two raw materials pumps, with one serving as standby. The pump is pumping the water at a total of 25 m and discharge of 16.7 l/s. This is pumped, through a 200mm diameter drain pipe for a length of 230m to reach the balancing chamber, from where it is released to the atmospheric pressure into the chamber. Its function is mainly to break the pulse of raw water pumps and to provide a continuous, steady flow to the clarifier. The balancing chamber has volume of $45m^3$. The water from the balancing chamber will then flow by graving to the clarifier. It flows through a transmission main, with a diameter of 200mm, duct pipe of 1.54 km length. The up flow clarifier is used as flocculation and sedimentation tank. Alum and lime are added to the raw water at the entrance to the clarifier. The clarifier has a total volume of 150 m^3. The suppressant water from the clarifier will then flow to the automatic graving filter. The clarifier is not working properly during the rainy season when the river water is full and gets it overloaded. The clarifier structure is in poor condition, with the exception of the internal metal structures, which badly need replacement.

The automatic gravity filter has a capacity of treating about 16.7 m^3 of water, but the filter below the drain is also broken and not correctly filtering. The treated water will then flow by gravity into the service reservoir. The sand used for filtration purpose is used for a long period of time without replacement, meaning its filtration capacity is very low. The automatic gravity filter is very old and needs to be replaced. The water from the service reservoir supplies the town with the gravity through their distribution system. The service reservoir is a circular reinforced concrete, has a capacity of $500m^3$, and is in a good condition and will be used with the new scheme. The outlet pipe is 250mm diameter. The valve room of the reservoir, which is controlled, accommodates the valves by which the water flows into. Two service pumps are housed in the value room to provide water to the operation building. A water meter incorporated on the outlet pipe in a separate chamber pipe registers the total consumption as the town. Chemical solutions are prepared at the operation building and pumped from there to the clarifier and reservoir. This building contains: laboratory and operation rooms; alum and lime dosing plan; chlorination plant; guardroom; and the toilet and shower rooms. The distribution network is constructed of PVC pipes and additional galvanized steel pipes that have been laid since the initial installation of the project. The distribution pipes have diameter 250, 200, 150, 100, 80, and 50 mm PVC with pressure classes depending on the area elevation through which the pipeline passes. The present total length of the distribution pipes is about 272,003 km. The total water production from the sources is $136m^3$/hr. The source of power for the intake, boreholes, and treatment plant is from national grid line. The water supply of the town is shared with the surrounding rural areas through the public water points located on the town periphery. The trend of AWSSE customers is shown below.

Table 6: Customer Classification in the service provision by AWSSE

Customer type	**Year**				
	2004	**2005**	**2006**	**2007**	**2008**
Private	2655	2986	3358	3728	4145
Commercial	146	152	162	167	174
Government	117	123	130	135	151
Total	2918	3216	3650	4116	4470

Source: Ambo Water Supply and Sewerage Service Enterprise, 2008

The total existing customers are 4,470, which include 4,145 private consumers, 174 commercial customers, and 151 government customers. The water supply coverage, up to year 2008, reached 80%. The existing water loss in supply is 18%. According to a field visit observation on site, a slight extension in the distribution system had newly added lateral pipelines laid for those new settlements, considered previously under uncovered areas. Whereas the remaining distribution system pipelines are old, as were laid during the late 1930's for the town. In addition, some distributing pipes are laid inside private compounds. Generally, the distribution system of Ambo town needs replacement of the old pipelines distribution system and may extend distribution pipes to those uncovered areas where the system is not reached. There are 34 public fountains supplied from the Ambo distribution system, almost all are well constructed, well fenced, and have a drainage ditch, but needs rehabilitation on drainage ditches and soak away pits. Some public fountains are not functional, because water does not reach the public points due to low pressure.

WATER SOURCE: BOREHOLES

In order to increase the water supply of the town, two boreholes were drilled in 2003 and another borehole was drilled in 2008. Borehole 1 and 2 have depth of 98.5m and steel casing of 65/8", which are found at an elevation of about 2,185 east of town and about 4km from the Ambo town. Steel surface casing 12 1/2" and UPVC production casing of 65/8" were installed. The drilling contractor, Oromia Water Works Construction Enterprise (OWWCE), drilled the well in 2003, under the supervision of the Oromia Water Resource Board the client. As per the drilling and pump test of the contractor, the static and dynamic water levels were 30.65 and 39.6 below ground level, respectively. The yield of the well, which was determined during the pump test, was 2.51 per sec. The pump capacity, which was determined by the pump test, was 17m3/h with 297m and 18.5kw power. The riser pipe used was 2", which was the recommendation after the pump test and indicated that the permanent pump position of the well should be between 69.3m and 74.8m depth. The safe continuous discharge of the well should be 2.51 per sec., and the current record of production a discharge of 71 per sec. The water quality test, which was a result of the sample that was taken from the source, showed that it was physic-chemically potable. Borehole 3 had a depth of 143 m and a steel casing of 8," which is found at an elevation of about 2,183 kms east of the town and 4 km from the Ambo town. A steel surface casing were provided for the PVC pipes of for 12 m m. The drilling contractor, TANA Water Well Drilling PLC, drilled the well in 2008 under the supervision of the Oromia Water Resource Board client. As per the drilling and pump test of the contractor, the static and dynamic water levels were 89.48 and 89.79 below the ground level, respectively. The yield of the well, which was determined during pump test, was 10.9 1/sec. The pump capacity, by which the pump test had been done, was 9.2 kw power and the pump position was at 122 m high. The riser pipe was 2" and the recommendation after the pump continuous discharge of the well should be 10.9 1/sec. From the current record of production of the water rate, the source showed that the average discharge is 101/sec.

WATER QUALITY TEST

As per the laboratory reported, the water test concluded that it was physic-chemically and bacteriologically safe for consumption. The boreholes were fenced and protected from any entrance. The power source for the three functional boreholes pump was from hydroelectric power that was connected to a switchboard, placed in the powerhouse in cases of power failure, but the bureau had installed a generator to support the operation of the treatment plant.

OPERATION AND MAINTENANCE

The overall operation of the scheme was carried out by the Water Supply and Sanitation Enterprise. The capacity of the utility on maintenance work was mainly on leakage controlling of small size pipes at distribution and leaking faucets at public fountains and private connections. Maintenance of electro-mechanical and major civil structure and developing or cleaning of boreholes was carried out by the zonal water resources office and/or Regional Water Resource Bureau. The utility had no operation and maintenance manual and no regular schedule for maintenance of elector-mechanical equipments. The town water supply scheme lacked sketches or building information.

Table 7: Water Production and Consumption

S/N	Description	Unit	2004	2005	2006	2007	2008
1	Water production	m^3/year	409399	462376	520663	550673	608197
		1/s	12.98	14.66	16.51	17.46	19.29
2	Water consumption	m^3	373741	404877	437896	431122	497316
		1/s	11.85	12.83	13.89	13.67	15.77
3	Non revenue water	m^3	356518	4722	82767	119551	110881
		%	9%	12%	16%	22%	18%

Source: Ambo water supply and sewerage service Enterprise, 2008

PUBLIC TAP

The total number of public fountains in the town is 34. The public manages 21 the public fountains, and the rest of the fountains are managed by the service. The public taps are attended to five days of the week (from Monday to Friday). Coupled with shortage of water supply, the condition had resulted in a high waiting time at the public tap on the dates during the end and beginning of the week. The water bureau, whenever it was needed, provided the maintenance. A contractual agreement was signed between the bureau and the individual for properly attesting, selling at the official water tariff rate, taking care of the public tap, and the sanitation of the area. But the remuneration to the public tap attendant is not disclosed. The transfer of management of the public tap to the public enabled timely attending, reduced administrative cost, and improved customer relation. The water meter reading and cash collection were monthly. The account prepares cash receipt and the cashier collects against the receipt and deposit in the bank. The water sales receipts were used, but limited public taps are not fenced and the water meters are at high expose to the theft.

TARIFF AND BILLING SYSTEM

Proclamation no. 18/2004 provided for the establishment of the urban water supply and sewerage service enterprises of the Oromia Regional state. Article 8, sub article 3(b) clearly stated the roles and responsibilities of 1st and 2nd grades as part of their constitution. TWSSS enterprise water boards on tariff. i.e. "appraises the service water tariff the enterprise submitted to it and passed it over to the concerned organ for approval". Another related to the ratification power on water tariff in the first and second grade urban water supply enterprise to change completely, or partly or reject it is stated in the proclamation no 97/2005, a proclamation to amend the urban water supply and sewerage service of Oromia National Regional states, establishment proclamation no. 78.2004, article 3, sub article 3(1) stated that the regional water resource

development bureau, shall ratify the water tariff studied by the 1st and 2nd grade urban water supply enterprise as a whole, amend or reject. The existing water tariff was studied by the regional water resource bureau and was implemented in the May, 2006. There are two water tariff systems, one is the uniform tariff rate for the public fountain and another blocked tariff with progressive rate individual consumers having service connection. The water tariff of Ambo TWSSS was indicated in Table 8.

Table 8: Existing Water Tariff Structure and Associated Tariff Rate

Consumption Blocks (m^3/month)	Tariff /birr/m^3)
1-3	3.00
4-7	3.45
8-10	3.95
> 20	4.50
Public fountain	2.50

Source: Town Water Supply and Sanitation Service, 2008

In addition, for the tariff for water consumption individuals must pay the water meter rent on their monthly bill. The water meter rent is set progressively, depending on the size of the water meter. The existing water meter rent is birr 2 for water meter size 1/2"; birr 3 for water meter size 3/4"; birr 10 for water meter size 1"; birr 15 for water meter size 1 1/2"; and birr 20 for water meter size 2". The town water supply sewerage service charged the customers that are connected to the town water supply system, maintenance works that are carried out on the water meters, and pipes of customer, etc.

BILLING SYSTEM

A computer has been used for billing since the year 2002. The billing cycle is monthly and involves a water meter reading, data entry and analysis, bill preparation, and collection. There is staff trained in the computerized billing system, who manages billing activities, including water meter reading. Water meter reading is performed on a monthly basis on the last ten days (20^{th} to 30^{th}). The task begins with data entry, analysis, and detection for errors. The most commonly occurring errors are negative consumption, over consumption, and entry consumption record. Before finalizing bills, it is checked by the bill worker and then approved by the finance head and the service head. There are four meter readers as permanent employees, who record the reading by using sheets and the customer's card. This activity is carried out on the 1^{st} to 5^{th} of the every month. Bill preparation dates are from 7^{th} to 10^{th} of every month. Once the analysis sheet is approved the billing team will automatically produce the bill. The schedule for bill collection is carried out from 15^{th} to 30^{th} of the month and for outstanding bills, from 1^{st} -10^{th} of the month. Annually, only 89% of the billed amount is collected. This means that there are still unpaid bills (11%) from revenue collection, which is a loss for TWSSE. The collection is centered at the TWSSE and with 2 bill collectors. During the field visit, the TWSSS enterprise collected the bill for the month September and read for October. The meter readers reaches out to 2235 customers and a bill customer services 1117 customers..

CONSUMER GRIEVANCE AND RESOLUTION

Ambo town water bureau have direct customer contact in matters of service provision. These services, when not provided, the customers directly report to the bureau as viewed by the general manager of the bureau. The most frequent complaints include break down of water supply due to different factors, like title problem on water supply system; and poor management (customer handling) practice among some officials. The bureau allows the concerned department to resolve the complaints under their jurisdiction by themselves. Since the grievances of the customer are not high, the departments handle most complaints easily. The bureau reimburses the customer whenever they find it right. The compensation scheme includes the practice of 'whom so ever available' mechanism including direct cash payment as reimbursement to aggrieved customers. Some of the complaints can be answered substantially by improving and enhancing administrative and technical skill and input. For example, one reason for the down of water supply is the absence of power. This can be handled by installing a stand by the automatic generator. The bureau had received remarkable results since May 9, 2001 by installing a stand by the generator around the treatment plant and borehole.

SOME ISSUES ON WATER SOURCES, SUPPLY AND DISTRIBUTION IN AMBO

Almost 93% of individual users responded that the water supply is not on a daily basis. Its non-availability is mostly related with the power break down and the summer overflow into the treatment plant. However, the first problem (problem of power) has been resolved by installing a standby automatic generator around the treatment plant and the borehole pumping station.

The coverage of the water service in the town has reached 75 percent, while in the surrounding rural kebeles it has reached 45 percent. This was to enhance the coverage and improve the service water bureau. Since then, it has launched two projects. The first is an immediate improvement service project. Under this project, the bureau underwent a maintenance of treatment plants, installation of stands by the generator, and the development of one borehole. This immediate improvement project is expected to raise the supply of water and its coverage to 93 percent in the town and to 65 percent in rural kebeles for the coming years. The other project that is still under feasibility study is the World Bank project that is for the next 30 years. The project is estimated to secure 100 percent service for the coming 30 years. Currently, the Water Bureau uses a tariff which does not cover the operational costs. Nonetheless, the bureau is managed, despite a budget deficit by not improving the service efficiency levels, but by the recurrent budget arrangement with the government.

The town's individual consumers have a different opinion regarding the affordability of the bill. About 57.8 percent of them regarded the bill as being fair, while 31.57 percent regarded it as expensive, and 10.52 percent regarded it as cheap. However, the respondents were not willing to pay for any price increment. In addition, 36.37 percent of the respondents, under the category of fair, are also sensitive to respond positively to price increase, holding their consumption constant. Nonetheless, the remaining customers are not willing for any unit price increase in their bill, perhaps because of the poor service in some areas.

The existing pumps and shuttering gates at the intake are very old and remain non functional. Besides to get them replaced not easy. The chlorine pumps and switch boards are not usually working as they get clogged and affect the flow of the chemical solution. Automatic backwashing system of the sand filter is not working, so it is washed manually. The existing treatment plant is very old and cannot produce the required demand of the town. The existing reservoir does not have sufficient storage capacity to reserve the required daily supply need in meeting water demand and supply. The access road to the intake site is highly damaged.

The only maintenance scheme available for the own tap customer is using the bureau technician. But this does not become operational for large government institutions and businesses. Lack of technically qualified technician and heavy dependence on one technician becomes not only scare service but also effective maintenance function is negligent . The technical manual is not in place and affects the smooth delivery as operations and maintenance functions are poor because the technicians are not available, except from regional water bureaus. This means that there is a heavy dependence on the national, regional, or zonal bureaus for technical inputs. There is delay, red tape, inefficiency, and ineffectiveness; bill related problem due to faulty water meter reading; misleading while decoding and computer error during the time of processing; delayed maintenance, especially during the summer when most technical staff are involved in a treatment plant maintenance. The operators and maintenance staff are not trained on their day to day activities. There are no working manuals prepared and most of the operators are not qualified for the job. There is no laboratory facility for water quality test and monitoring. Most of the existing distribution pipes are very old, create high leakage, and do not reach most the town areas.

Any portable water source needs to satisfy the physio-chemical and bacteriological water analysis test requirements as being safe and acceptable. Otherwise, it would result in water borne diseases, which increases child mortality. In Ambo town and surrounding rural kebele, in general, about 45.84 percent have been infected with water borne diseases more than once. The remaining 54.16 percent were not infected before but this time. The prevalence is higher in the rural kebele, whereas almost 80 percent were infected by water borne disease once, as shown in table 9.

Table 9: Prevalence of water borne disease in Ambo

Incidence level	Rural	Urban	Total
None	20%	60%	54.16%
1-3 times	20%	35%	29.16%
4-6 times	20%	0	4.6%
7-9 times	40%	5%	12.5%

Source: own survey, 2008

Even if the prevalence of disease is so disastrous, all respondents have answered that they do not treat the water before drinking it. This has definitely increased the prevalence of water borne diseases in the town and surrounding rural kebeles. Revenue collection is still not addressed because of the proper service. However, more than 10 percent of the revenue collection from the customers is left without any measures, like the customer payment drive initiated by the water bureau.

SANITATION IN AMBO TOWN

The combination of safe drinking water and hygienic sanitation facilities is a precondition for health and success in the fighting against poverty, hunger, child mortality, and gender inequality. The high incidence of disease in Ethiopia, particularly among children, is largely attributed to a lack of safe water and sanitation. At the same time, poor sanitation practices are the major cause of surface and ground water pollution. The environment is deteriorating from time to time as the solid waste is not properly collected and treated. There is no proper solid waste disposal site and treatment plant. 49.6% of the houses have no toilet facility, and therefore the rivers and drains are collecting waste. The existing sanitation system in Ambo town is poor and lacks a sewage system, as each HH is responsible for its own waste disposal. The sanitation practices currently used are private pit latrines, collected residue pit latrines (council office, school, and clinic), septic tank, and defecation on ground/public highway/the edges of habitation areas. Factors, such as lack of toilet facilities, an adequate water supply in the slum area, lack of a sewage system, inadequate clearing/suction service, and poor abattoir service are responsible for the deterioration of the situation. The data gathered from town health office gave a summary of sanitation situation.

Table 10 Summary of Sanitation Level in the Town

SNo	Description (unit = No)	Quantity
1	Private pit latrine	650
2	Shard pit latrine	1610
3	Number of houses without latrine	1082
4	Flash latrine	-
5	Commercial pit latrine	-
6	Solid waste disposal	4

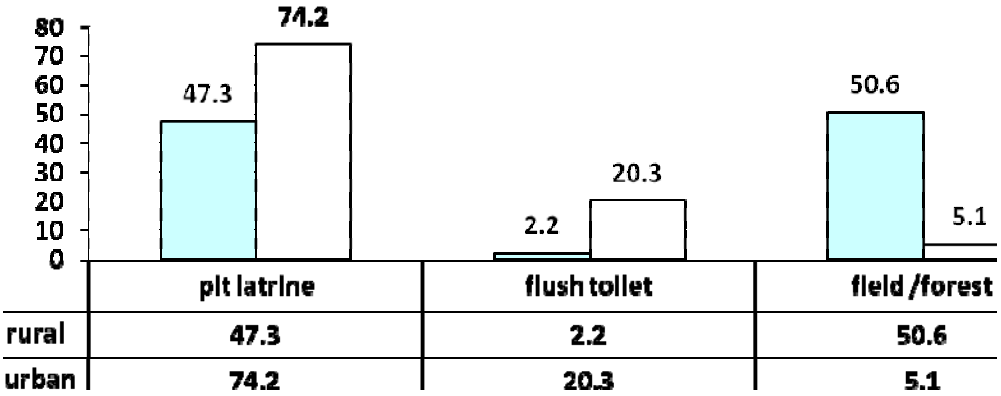
'- ' denotes Data not available

Source: Town Health Bureau, 2008

It can be said that by making comparisons between the current situations and the evaluation before ten years on rivers and drains. Ten years age (1997) 32% of the houses did not have any type of toilet facilities and, currently, 49.6% of the houses have no toilet facility. There is no single public toilet in the market area, where hundred of people are shopping. Liquid waste refuse is dumped into farmlands, causing health problems. Currently the municipal had to dump it into the bought land, together with the solid waste. Earlier it was easier to get the service as long as one has paid for the service, but now it takes a longer time. HHs and hotels waste are discharged onto streets, ditches, and rivers. There is no clear regulation for liquid waste disposal and their management. There is no plan and action to ameliorate the situation by the local authority. The sole municipal abattoir is poorly organized in terms of equipment and management. There is in the absence of sensitization programs.

One of the indicators of the living standards of the HHs is the availability of toilet. As shown in Figure 5, the general provision of a toilet is promising. Most the town residents and surrounding rural kebeles have access to the toilet. The remaining is still using an open field/forest. As the survey shows, negligible rural residents use flush toilet, but the remaining resort to a pit latrine or use the field/forest. In contrast, when discussing the town dwellers, only 5 percent use a field/forest and the remaining use pit latrine or flush toilets.

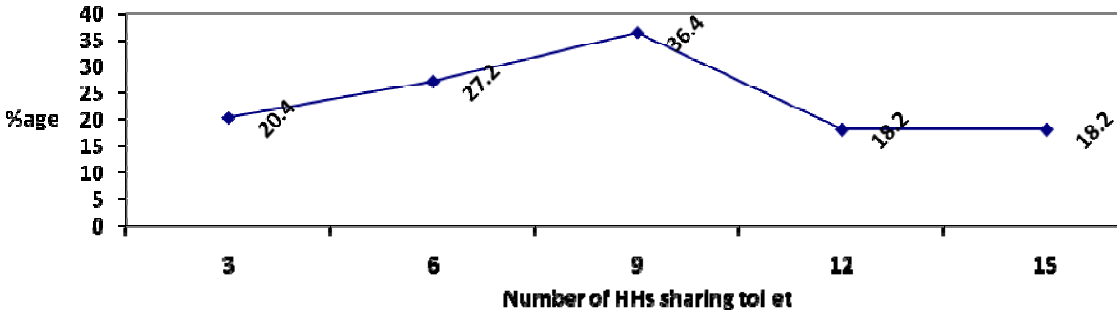
Figure 5: Type and Distribution of HHs toilets used



Source: Own Survey, 2008

In most developing countries, it is common to share a single toilet with many HHs in the premises. To show this clearly, we have sketched the grouped data in Figure 6.

Figure 6 Number of HHs sharing a single toilet



Source: Own Survey, 2008

The common practice of toilet construction is with brick, soil, wood, plastic, or other material in Ambo town. This study reveals that 50% of toilets use construction material like soil and wood. Another 32% of toilets constructed from the brick. About 15% of flush toilets are constructed from brick in the urban town. The partition walls in the toilet is mostly a plastic covers used for carrying farm produce plastic bags and sometimes toilet without walls are equally a common practice in this town. The agencies involved in construction of the existing toilet in the town are shown in table 11.

Table 11: T*oilet constructed by different agencies*

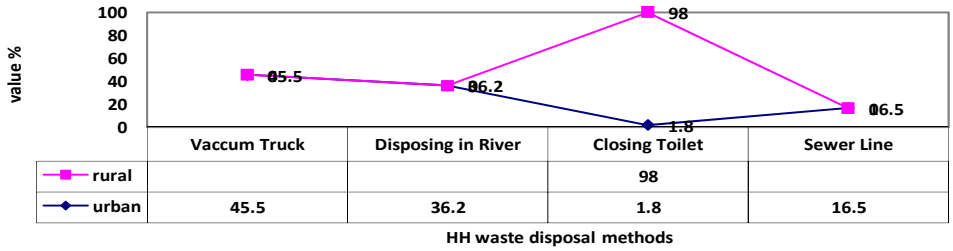
Constructing agents	*Percentage of toilet. constructed*
User it self	81.8%
Government	13.63%
NGOs	4.5%

Source: Ambo WSSB, 2008

SOLID WASTE PRACTICES IN HHS

HHs disposes the waste in their toilet through different mechanisms, due to improper sanitation facilities. Some of their practices are categorized as improper disposal methods, which are hazardous for human health and environmental quality. The method of direct disposition into the nearest rivers and/or main sewerage line is one of the common practices. Others may dispose wastes through a vehicle, yet others may choose to close their first temporary toilet and dig the next toilet in a new place on their premises.

Figure 7: Solid Waste Disposal Methods HHs



Source: Own survey, 2008

Almost all (98%) of the rural HHs dispose the toilet wastes by closing the existing toilet and preparing (digging) another hole. But this serves only 36.36 percent of the town dwellers. The most important fecal disposing method in the town is by using a vacuum track, which is used by 45.5 percent of HHs. The remaining 18.18 percent of HHs dispose the wastes directly to the nearest river or sewage line.

Finally, the waste disposal in the town is taking place by the door to door collection method, which is a partially covered service. The residents pay a nominal amount and the collection takes place every week by the self-help groups. There are high range areas where the push cart does not reach and, therefore, it is left subserviced. The Ambo town municipality has recommended that for the self-help group service, through a contractual agreement, that training will be provided. However, this is a meager service and there is no sufficient revenue generated by the municipality, even if they have delegated the service provision. The productive activities generate waste at the HH level, service sector, and industrial firms. Garbage collected from the individual HHs and business organizations are ash, metals, plastics, vegetable, garbage, cartons, papers, manure, and others. Their garbage disposal mechanism differs irrespective of whether they are proper or improper. Some of the most common methods in Ambo and in Ethiopia, in general, are disposing through vehicles/containers, dugout, burning, throwing away, or using the waste as manure. Throwing away may be regarded as improper and disastrous, even if it is still being used by many HHs with its devastating effect on human health and environmental sustainability. The survey showed that none of the rural residences have access for a vehicle/container. The most important method used among rural HHs are using the waste as manure (39.6 percent) and throwing away (26.4 percent). Dugout method and burning method are used by 26.2 percent of rural HHs. On the contrary, 47.6 percent

of town residence can dispose through vehicles containers, while 14.3 percent of the HHs uses the throwing away method or some practice burning on the premises methods.

CONCLUSION

The institutional structure at the town level is in place with the TWSSE. However, the institutional strengthening is required and badly curtails the efficient delivery of the services. The technical operations and maintenances consist of filtering, quality testing, oiling machines; non-technical and administrative services consists of meter-reading and computerized billing are poorly maintained. The chance for committing errors by personnel is higher in the present processes and denotes lethargic attitude. Tariff structure and tariff rate of bureau is not enough even to cover the operation costs of the bureau, which is heavily or highly dependent for its functioning on deficit finance from the government's recurrent budget. The water resource is presently rainfall dependent and, therefore, if the urbanization increases, then the current levels of supply may be insufficient. Any sort of measure to preserve the water's resource is neglected and, in fact, is seen as a waste dumping site along the river side. So in future, the possibility of polluted water supply cannot be ruled out. The rural residents still use unsafe sources and, therefore, portable water has not reached them. The rural poor are more susceptible to water borne diseases. So the local residents will benefit if they are trained on the safe water drinking methods.

While the sanitation is an ignored aspect due to the poor livelihood options of the residents as well as local authorities, they are unable to have a proper sewer system with a treatment plant. The current crude methods revealed that sharing the toilets is present, whereas the septic tank culture has also not been prevalent. It is difficult to tell the level of ground water pollution. For example, the community sanitation centers are not practiced in removing the age old practices, like going to the forest or covering the pits and digging another for the next use. These community sanitation centers can be maintained by the local unemployed youth or community leaders and can be maintained by them. The waste can then be reused for creating energy, like street lighting and community facilities, like reading rooms for school or college students. This helps in keeping the community clean and hygienic. The solid waste disposal methods are poor and inadequate. These also need to be addressed so that community environment improves and a safe environment is created. The final finding from the research is that the administrative and technical efforts are sporadic. Another influencing factor contributing in the existing situation is due to poor revenue generation. So resultant implication is a project intervention from external funding will enable to renew this grappling circuitous status. There is a need for a more strategic intervention to improve the services in this town.

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