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Abbreviation and Acronymous

AISC…… Agricultural Input Supplies Corporation

COC……...Certificate of Competency

E.C……. Ethiopian Calendar

EASE……. Ethiopian Agricultural Sample Enumeration

ERA……. Ethiopian Road Authority

FSOSZ……. Finfinne Surround Oromiya Special Zone

GDP……. Gross National Product

GTP……. Growth and Transformation Plan

HDW……. Hand dug well

HGW…… Horro Guduru Wollega

IRF…… International Road Federation

MoE……Ministry of Education

MSSE……. Micro Small-Scale Enterprises

NRM……Natural Resource Management

OPDC ……. ,,,,Oromiya Planning and Development

PSIR……... Practical Social and Industrial Research

RSDP……. Road Sector Development Programme

SA……Statistical Abstract

SDG……. Sustainable Development Goals

TVET……Technical and Vocational Education and Training

UN……..United Nations

UNESCO……United Nations Educational, Scientific and Cultural Organization

UNEVOC……. International Centre for Technical and Vocational Education and Training

URRAP……Universal Rural Road Access Program

Wash……Water, Sanitation and Hygiene

WHO…… World Health Organization

WWAP……..World Water Assessment Program

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General Introduction

For the convenience of readers, this ***Trends and Status of Socioeconomic Sectors*** review document analysis has been roughly grouped into four parts and presented under agriculture, water coverage, road facility, and TVET sectors in Oromiya regional state. Agriculture continues to play an important role in Ethiopian economy in general and in Oromiya region in particular economies, where it represents the economic mainstay of over 85% of the rural populations, of which more than half are smallholders. Agriculture accounts for the largest share of the export items and constitutes the largest proportion of the regional gross domestic product. It accounts for about 59.42 % of the total regional GDP. Oromiya region in Ethiopia is plays a central role in the national crop production, total pulses, oilseeds, root crops and total fruit crop production. Cereal's production is rank first in terms of area and production followed by pulses and oil seed ranks third level in terms of area coverage. Root crops gives high yield at small land area compared to all crops cultivated in Oromiya region.

A well-developed road transport sector in the country is assumed to fuel up the growth process through a variety of activities of the development endeavors of a nation. An effective road network can hasten progress in agricultural and rural development, industry and trade, the viability of urban areas, and the expansion of jobs, education and personal opportunity. By 2004 E.C the total stock of road network of Oromiya region was 43,548 km of which 3615 km was asphalt and the remaining 39,933 km was gravel road. On average, the network has been growing at a rate of 22% per annum over the period 2004-2011 E.C. On the other hand, there is also limited access to drinking water. Only 63% of the population has access to drinking water in 2011 E.C, in spite of the large number of water resources available in the region. Although, 48% of households have access to an improved source of drinking water in 2003 E.C. Urban and rural households rely on different sources of drinking water.

Moreover, the 1994 Education and Training Policy of Ethiopia is a big milestone in recognizing TVET. TVET has an important role to play in technology diffusion through transfer of knowledge and skills. In recent years, there has been considerable expansion in TVET institutions in Ethiopia in general and Oromia region in particular, both in terms of public spending and increased provision by private institutions. In Oromiya region, the number of technologies created and transferred to Micro Small-Scale Enterprises increased from 500 to 1487 between 2008 and 2012. The TVET technology promoted to MSSE has decreased from 58.8% in 2009 to 9.6% in 2012 in the region.

We would like also to inform all readers and users of this statistical reports used both the academic calendar of Ethiopian (E.C) and Gregorian Calendar (G.C) throughout the document.

1. Agriculture

1.1 Introduction

Agriculture is the dominant sector of the regional economy. It determines the growth of all other sectors and consequently, the whole region economy. The sector is dominated by small-scale farmers who practice rain-fed mixed farming by employing traditional technology, adopting a low input and low output production system. It provides foodstuffs, industrial raw materials, generates employment for the majority of the rural population which constitutes about 85% of the region as a whole. Agriculture accounts for the largest share of the export items and constitutes the largest proportion of the regional gross domestic product. It accounts for about 59.42 % of the total Regional GDP, while Service and Industry sector account for about 11.99% and 28.59% at constant price respectively in 2010, E.C. Oromiya region is endowed with good fertile and irrigable land and different types of agro-ecological zones and climatic conditions that are suitable for the growth of different agricultural productions.

1.2 Rural Kebele, Farmers Training Centre and Development Agents in Oromiya

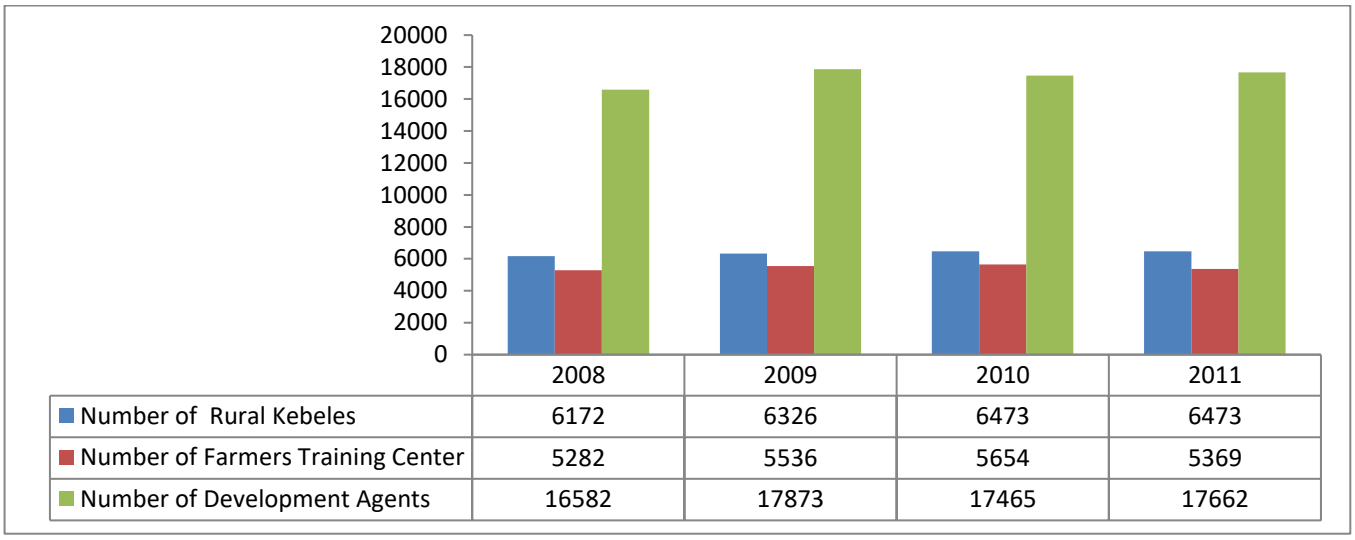
Administratively; by now, Oromiya is divided in to 21 Zones which in turn are divided into 363 districts. The districts also again sub-divided into smaller units which generally known as rural Kebeles and also known as the smallest administrative unit in Ethiopia. Each *kebele* consists of at least five hundred families, or the equivalent of 3,500 - 4,000 persons. In Oromiya region, the number of rural kebeles is increasing from time to time due to inaccessibility and administrative inconvenience. During 2008, the number of rural kebels was 6,172, and showed increment, to 6,326, in 2009E, C. However, this number is increased to 6,473 in 2010 and it remains constant for 2011 E.C.

Farmer training centres (FTCs) have been designed and used to improve agricultural extension services delivery in many developing countries. The centres were set up in 2002 in each rural kebele and it is governed by a management committee of between 7 -10 extension agents and farmers. The committee is chaired by the kebele head, who is also a farmer. At its monthly meetings, this committee plans, manages and evaluates the training and demonstration programme. It also organizes farmers to help in setting up and maintaining the demonstration fields (Alemayehu, 2003). In Ethiopia, one FTC designed for every Keeble (MoA). In 2008, there were 5282 FTCs in Oromiya Region which increased to 5536, in 2009 and 5654 in 2010. The trend was changed in 2011 when the number of FTCs decreases by 285 between 2010 and 2011E, C.

According to Ministry of agriculture (MoA), each FTC is to be staffed by three DAs (one each in the areas of crops, livestock, and NRM) and supported by a travelling DA covering three FTCs and trained in cooperatives management or a related field. Each DA is expected to train 120 farmers per year in his or her field of specialization. He or she is also expected to provide modular training to 60 farmers every

six months in his or her field of specialization. In 2008, there were only 16,582 DA in Oromiya and increased to 17,873, in 2009. However; during 2010 the number of DA decreased to 17,465 and again increased to 17,662, in 2011. This trend of FTCs in the region was showed that there were no constant trends in the periods of 2008-2011 E.C.

Figure: 1.1 Number of Rural Kebeles, Farmers Training Centre and Development Agents



	2008	2009	2010	2011
Number of Rural Kebeles	6172	6326	6473	6473
Number of Farmers Training Center	5282	5536	5654	5369
Number of Development Agents	16582	17873	17465	17662

Source: OPDC, 2008 -2011 EC.

1.3 Agricultural Households

Agricultural house hold is considered as an agricultural household when at least one member of house hold is engaged in growing crops and/or raising livestock in private or in combination with others (EASE, 2003). In other words, agricultural house hold can be defined as one in which any one makes some income from self-employed farming activity. Agricultural household can be male or female, while the number of female house hold is very limited in Africa at large and in Ethiopia too. Moreover, females are participating in agricultural activity in different ways. However, the reality in Africa indicates that, though women play important and varied roles in agriculture, but they have unequal access, relative to men, to productive resources and opportunities (FAO, 2010). As it can be seen clearly from the table 1.1, in average, greater than 85% of the total house hold is male while the rest 15% is female house hold for the year between 2008 and 2011.

Table1:1 Number of Agricultural Households Member,2008-2011

Year	Number of Agricultural Households Member		
	Male	Female	Total
2008	3840464	692334	4765896
2009	3979864	669198	4650458
2010	2882427	1257108	4035836
2011	3971386	700968	4672355

Source: OPDC, 2008 -2011 EC.

1.4 Crop Production and Area Under Crop Coverage

Crop production is concerned with growing crops for use as fibre and food (FAO,2006). The two main crop seasons in Ethiopia are the Belg and Meher seasons which receive rainfall from February to June and from June to October, respectively. The Meher crop season is the main season and produces 90-95% of the nation's total Crop output, and the Belg harvest provides the remaining 5-10 % of Crop output (MoA,2003). On the other hand, any crop harvested between Meskerem (September) and Yekatit (February) is considered as Meher (Main) season Crop of Ethiopian (Agricultural Enumeration, 2003). Since Meher is the most dominant crop production season in Ethiopia. From the table 1.2 annex, in Oromiya, cereals production is rank first in terms of area and production followed by pulses. Despite of data inconsistence and availability, oil seed ranks third level in terms of area coverage. However, relative to oil seed, vegetable gives large production on small area. Root crops gives high yield at small land area compared to all crops cultivated in Oromiya region.

1.5 Agricultural Inputs and Extension Services

The backbone of any agricultural revolution is access of farmers to modern agricultural inputs. These agricultural inputs range from improved seeds, fertilizers and crop protection chemicals to machinery, irrigation and knowledge (Value & Businesses, 2015). However, the small household farmers were experienced with low production and productivity, which are highly associated with limited supply of fertilizer technology, lack of awareness about the importance of fertilizer, lack of knowledge and capacity, lack of sustain training on the use fertilizer, inadequate cash or credit for purchase of inputs (Eba & Bashargo, 2014) which shortly characterized agriculture in our country traditional and subsistence peasants farming sub-sector whose access to modern technology and basic education is very limited (T. L. Tefera et al., 2014) In fact, to change this experience, many actions have been taking place from the government of Ethiopia as well as regional governments. The major concern of the government

was arranging marketing system. Before the collapse of central planning in 1991, fertilizer markets in Ethiopia have been controlled by the government through its input marketing agency, called AISC, later renamed as Agricultural Input Supplies Enterprise (AISE) in 1992. This agency had its own marketing network throughout the country, which included marketing centres and service cooperatives for distributing fertilizers to the farmers(Rashid et al., 2014)

1.5.1 Fertilizer Consumption

Land degradation in the form of soil erosion and soil nutrient depletion are critical challenges to agricultural production and economic growth in Ethiopia(Sime & Aune, 2014).Rapid population growth expected to be the major factor for soil depilation. While rising population density and farmland scarcity typically causes a transition from fallow-based systems to permanent cultivation , more intensive cultivation, uncontrolled deforestation of the natural vegetation cover for farmland expansion, high stocking rates, and farming practices with little concern for conservation and poor soil management practices may lead to protracted environmental and soil degradation which can significantly reduce soil fertility(Legesse et al., 2019).

Fertilizer is considered as one of the most important inputs for the achievement of increased agricultural productivity and food security. Historically, the utilization (consumption) of fertilizers in Ethiopia as well as in Oromiya has long time event. Given the large variability of the size and the farming system of the different regions of Ethiopia, different regions have different consumption trend. Of the 11 regions including city administrations, the four major regions (Oromiya, Amhara, SNNP and Tigray) consumed on average more than 94.80% of the fertilizer in Ethiopia. From the four regions again, consumption is in the order of Oromiya > Amhara > SNNP > Tigray and the percentage share of these regions is 36.6%, 35.8%, 15.5% and 6.9 % in the period 2010 -2015 G.C respectively (IFDC,2015).

Urea and DAP (di-ammonium phosphate) fertilizers have been the only fertilizer sources that have been in use in the Ethiopian agriculture for more than four decades. Even though the amount of fertilizer imported increases every year, Ethiopian farmers still lag far behind other developing countries in fertilizer use. The average intensity of fertilizer uses in the country (which is roughly less than 40 kilograms per hectare) remains much lower than elsewhere (e.g., 54 kg/ha in Latin America, 80 kg/ha in South Asia, and 87 kg/ha in Southeast Asia) (IFDC,2015).

Even though, the data table 1.3 below shows vary between the years, in average, NPS is the most widely used fertilizer followed by UREA and DAP respectively.

Table 1.3 Fertilizer Consumption in Oromiya,2008-2011

Year	NPS	DAP	UREA
2008	549237	1859353	1099128
2009	552857	800282	898729
2010	3539488	845644	644486
2011	2591896	162359	1320999

Source: OPDC, 2008 -2011 EC.

1.5.2 Usage of Improved Seeds

Agriculture in our country is dominated by small holder farmers, cultivating through traditional way which results low production and productivity. As a result, millions of people are not able to feed their family members. Therefore, adaptation of agricultural technology is a replicable indeed. To do this, improved seed needs to come at the first stage because; it is only improved seeds that overcome stiff character of fertilizers and pesticides. According to MoA, 2013, clearly state that, for smallholder farmers, investing in varieties of improved seeds and modern inputs is a critical step towards increasing yields, and as a result, improving livelihoods. So that, increasing the quality of seeds can increase the yield potential of the crop by significant folds and thus, is one of the most economical and efficient inputs to agricultural development (FAO, 2006). As we see, the data from the table 1.4 shows that maize is the most widely distributed improved seeds to farmers by cooperatives followed by barley and teff respectively. While Sorghum is the least distributed improved seed to farmers.

Table 1.4 Number of Improved Seed from 2008-2011

Year	Teff	Wheat	Maize	Barley	Sorghum
2008	37035	675027	142247	15674	10065
2009	45795	75739	733137	17347	1556
2010	36555	70308	732995	15353	1222
2011	34113	167020	183324	6479	6396

Source: OPDC, 2008 -2011 E.C

1.5.3 Pesticides and Herbicides

Herbicides and pesticides have been used to control, eliminate or destroy pests in order to protect human being's food (Bushra Rashid et al. 2010). A pest is any animal or plant harmful to humans or human

concerns. The term is particularly used for creatures that damage crops, livestock, and forestry or cause a nuisance to people, especially in their homes (Wikipedia, the free encyclopaedia). According to data collected in the below table1.5 indicates, farmers are using pesticides widely which is available in the form of powder, liquid and tablets. However, liquid pesticides form that farmers frequently used whereas, powder ranks averagely followed by tablets.

Table 1.5 Pesticides and Herbicides Used by Farmers

Year	Type of Pesticides			Herbicides (Lt)
	Powder (Kg)	Liquid (Lt)	Tablets (Doz.)	
2008	31208	229617	36860	774152
2009	25735	288077	22773	878356
2010	116196	27397	99362	703876
2011	25972	434764	30714	1212636

Source: OPDC, 2008 -2011

1.6. Irrigation

Irrigation is defined as the artificial application of water to arid land and at last rainy period's for growing crops and also essential for growth as it enables off-season farming, provides the potential for multiple harvests per year, and brings additional land under cultivation (Value & Businesses, 2015). In developing country including Ethiopia, modern irrigation is not much practiced and that most dominant small-scale irrigation is highly traditional by its nature. It is traditional because, application of water engages many farmer household members including women and children who are the main responsible for fetching water, even when it requires traveling long distances, up to half a day (UNESCO-WWAP, 2004).

1.6.1 Farmers in Irrigation Farming

Gender implications of irrigation must be considered to ensure that both men and women have the opportunity to adopt irrigation technologies and benefit from these investments.(Feed the Future, 2016). Furthermore, our agricultural activities are dominated by male households and farmers. From the table 1.6 below that depicts the land cultivated under irrigation and the number of farmers participating is increasing from time to time. During 2011, 82% of participated farmers were male and the rest18% was female.

Table 1.6 Cultivated Land and Participated Farmers in Irrigation Farming,2008-2011

Year	Participated Farmers	
	Male	Female
2008	2366477	290879
2009	2268769	341428
2010	1107790	126471
2011	1525387	275389

Source: 2008 and 2009 (CSA) and 2010 –2011 (OPDC) EC.

1.6.2 Land Cultivated and Production by Type of Irrigation

From the history of irrigation farming in Ethiopia, traditional irrigation dates back several centuries, especially in the highlands for subsistence food crops, while "modern" irrigation was started by the commercial irrigated sugar estate established in the early 1950s. According to FAO evaluation of irrigation development in Ethiopia, 2016, modern small-scale irrigation through communal schemes started in 1970s to fight major droughts and famines, especially the 1973 one. Modern private irrigation however, has very short history that re-emerged with the liberalization of the economy in the 1990s. In case of Oromiya, as we can see from the table below 1.7 indicates, currently most of land cultivated under irrigation is traditional when compared with modern irrigation.

There are studies, however, that show that local water management institutions are stronger in traditional schemes compared to modern irrigation, as a result of which the performance of traditional schemes could be higher. In 2008, the total reported area of irrigated agriculture in the region was about 1,513,404 ha, out of which 739,883 ha is from traditional irrigation, 82,375ha is from modern irrigation schemes. However, the traditional irrigation schemes are decreased from 739,883ha in 2008 to 311,630 ha in 2011.By and large, land cultivated and production by modern irrigation schemes are decreased from 823,75ha in 2008 to 64,609ha in 2011 in the region. But agricultural productivity remains very low partly due to limited access to agricultural technologies, limited possibility to diversify agricultural production, underdeveloped infrastructure, and weak or sometimes lack of access to agricultural markets and to technological innovations.

Table 1.7 Land Cultivated and Production by Type of Irrigation,2008-2011

Year	Traditional		Modern		Pump		Hand well		Lake	
	Area (ha)	Production (qun)	Area (ha)	Production (qun)	Area (ha)	Production (qun)	Area (ha)	Production (qun)	Area (ha)	Production (qun)
2008	739833	80654998	82375	13105154	376603	50823076	314593	26459717	47516	4779872
2009	721370	76302145	131018	16783170	371904	47851631	100705	11012958	13730	1123279
2010	462618	49865147	112430	12869941	330500	40743689	294041	16007413	14309	960065
2011	311630	39417300	64609	6763698	141285	25898542	17489	1915636	13621	703009

Source: OPDC, 2008 -2011 EC

1.6.3 Distributed Fertilizer and Improved Seeds for Irrigation

Improving productivity and profitability of smallholder farming is the main pathway out of poverty in using agriculture technology. Improved agricultural productivity for smallholders can reduce poverty and improve household welfare (world Bank,2008). To feed the rapid growth of population development, irrigation and management of fertilizer are essential. According to the data in the year hander the consideration (2008-2011 E.C) DAP 285, 727, UREA 639,201, NPS 534,895, and improved seeds 2,388,747 quintals are used in irrigation farming. While the use of improved seed and DAP chemical fertilizer is decreased in time of 2008-2011. DAP chemical fertilizers which are widely used and distributed; however, it is declined from 181,935 in 2008 to 34,704 quintals in 2011 while UREA chemical fertilizers which ranked second which is declined from 147,369 in 2008 to 112,663 quintals in 2011.

Table 1.8 Fertilizer and Improved Seeds Distributed for Irrigation,2008-2011

Year	DAP	UREA	NPS	Improved Seed
2008.00	181935.00	147369.00	40525.00	2100281.00
2009.00	42915.00	203746.00	86691.00	164310.00
2010.00	26173.00	175423.00	161314.00	51705.00
2011.00	34704.00	112663.00	246365.00	72451.00

Source: OPDC, 2008 -2011 EC.

1.6.4 Cooperatives Members Participated on Irrigation Development and Cultivated Land

A cooperative is "an independent association of women and men, united voluntarily to meet their common, social, cultural needs and aspirations through a jointly owned and democratically controlled enterprise. Traditional cooperatives associations existed in Ethiopian society centuries ago in the form of iqub and idir. However, the history of formal cooperatives in Ethiopia dates back to 1960, when the first directive of cooperatives was enacted (Emana, 2009). Through co-operatives, smallholders may obtain inputs, adopt new agricultural technologies and access technical assistance. They can also provide credit services to member farmers which ease production constraints (D.A. Tefera et al., 2017). Cooperatives are also involved in output marketing, creating market opportunities and in serving as a market channel (Mojo et al., 2018). Moreover, cooperatives are accountable in the farming activity, especially in irrigation farming activity where there are huge cultivable land areas. By 2011 there were 1,742 cooperatives with male member of 137,637 and female member 19,003 with an estimated land of 228,479 $km^{2.}$ in Oromiya.

Table 1.9 Numbers of Cooperatives and Members Participated on Irrigation Development and Cultivated Land,2008-2011

Year	Number of Cooperatives	Cooperative Members		Cultivated Land
		Male	Female	
2008	5,914	220,899	33,397	221,771
2009	10,635	277,563	72,055	335,790
2010	1,985	140,935	17,086	268,213
2011	1,742	137,637	19,003	228,479

Source: OPDC, 2008 -2011 EC.

1.7 Livestock

Ethiopia has the largest livestock population in Africa. Oromiya region produced the largest share in livestock population in Ethiopia. It plays an important role in providing export commodities, such as live animals, hide, and skins. Besides, livestock products (meat, milk, eggs, cheese, butter supply, etc) provide the needed animal protein that contributes a lot to the improvement of the nutritional status of the people of the region. The livestock sector in Oromiya contributes 10-16.8% of the total and agricultural Gross Domestic Product (GDP), respectively (OPDC, 2010).

Currently, cattle which ranks first from the total population of livestock in Oromiya, is estimated above 42 mill. with an average increment of 1mill. annually and poultry ranked second with the total population of above 30mill. with an average increment of more than 3mill. yearly and goats ranks third with the

total population of mor than 18.7 mill. Furthermore, according to data obtained from PEDCO, presented in the table 1.12 sheep (15,823,705) comes at the fourth level, donkey (3,897, 856), Horse (2948062), camels (1684441) and Mule (770,605) ranked respectively.

Table 1.10 Livestock and Poultry Population in Oromiya,2008-2011

Year	Cattle	Sheep	Goats	Horses	Mules	Donkeys	Camels	Poultry
2008	23,336,510	9,486,687	8,377,584	1,242,071	152,178	3,214,317	272,344	21201122
2009	24,144,361	9,866,172	8,129,784	1,296,520	140,114	3,446,746	299,422	20,408,299
2010	41,533,364	16,023,457	17,480,240	2,865,012	792,199	3,801,982	1511010	25,824,879
2011	42,118,607	15,823,705	18,735,759	2,948,062	770,605	3,897,856	1684441	30,317,598

Source: OPDC, 2008 -2011 EC.

1.7.1 Household by Ox Holding Size

Many researches finding conducted on Socio-technical perspectives of smallholder agriculture in Africa particularly in Ethiopia categorize our economy as agrarian which is highly subsistence in its nature and refers to sedentary, ox-plough-based and mixed agriculture. Merely, the mode of production is highly traditional, based on small-scale fragmented pieces of land, and aims mainly at satisfying only household daily needs (Olowu et al., 2014) .This imply that ox is the only means of cultivating land for small scale farming agriculture. From the basis of this facts, in Oromiya region indicate that most agricultural households are Ox based plough. However, table 1.11 below indicates, an average of 83% farmers owned less than 3 oxen while 70% farmers owned above 3 oxen per farmer for 2011 in Oromiya.

Table 1.11 Number of Household by Ox Holding Size,2008-2011

Year	Household by Ox Holding Size					
	1 Ox	2 Oxen	3 Oxen	4 Oxen	5 Oxen	> 5 Oxen
2008	2,713,884	1,229,757	1,820,008	194,464	230,672	73,496
2009	1,636,539	2,309,975	211,437	238,843	87,181	_
2010	1,394,030	1,452,455	767,362	338,713	184,109	111,184
2011	1,633,229	1,871,952	1,043,186	466,819	278,787	150,968

Source: OPDC, 2008 -2011 EC.

1.7.2 Hybrid Livestock Distributed to Farmers

In biology, according to (Wikipedia, Free encyclopaedia) a hybrid is the offspring resulting from combining the qualities of two organisms of different breeds, varieties, species or genera through sexual reproduction. Genetic improvement of the indigenous cattle, basically focusing on crossbreeding, has been practiced for the last five decades but with little success in Ethiopia (Aynalem Haile, et al, 2011). In Oromiya, the number of hybrid livestock and poultry distributed to farmers shows an increasing trend between 2008 - 2011. As the data indicates, poultry distributed to farmers over the periods (2008 - 2011) is greater than hybrid livestock in the region.

Table 1.12. Number of Hybrid Livestock Distributed to Farmers,2008-2011

Year	Type of Hybrids Livestock				
	Poultry	Heifer	Sheep	Calf	Others
2008	1380428	17320	1315	29375	18414
2009	2737416	16047	2385	8642	57843
2010	4926279	81397	196033	107866	39660
2011	5463535	84463	195400	95604	55577

Source: OPDC, 2008 -2011 EC.

1.7.3 Veterinary Personnel

Despite of large population of livestock in Oromiya, the productivity is not adequate because of widespread animal diseases, poor feeding system, traditional husbandry practices, etc. In order to mitigate the problem with livestock productivity and to maximize the production, different strategies which encompass veterinary infrastructure developments, staffing veterinary institutions with professionals, treatment and vaccination services as well as hybrid livestock and poultry distributions were designed and implemented in the region. The data from OPDC, 2011 indicate that number doctors, veterinary technicians, and livestock health assistances are 677, 3881 and 648 respectively.

Table 1.13 Number of Veterinary Personnel,2008-2011

Year	Doctors	Health Assistant	Health Technician
2008	556	4500	575
2009	614	4702	427
2010	856	5865	691
2011	677	3881	648

Source: OPDC, 2008 -2011 EC.

1.7.4 Veterinary Clinic and Health Post by Type

Oromiya with the largest livestock population needs compatible animal health policies and strategies to overcome animal diseases which harm production and productivity of animal resource. According to Animal health strategy and vision for Ethiopia, approximately; one animal health clinic or post will provide health services per three peasant associations (PAs) or kebeles. From the table 1.14 that shows number of veterinary clinics by type in Oromiya, the most widely exist clinic type is type D, C, B respectively and type A is rarely available in the region.

Table 1.14 Number of Veterinary Clinic and Health Post by Type,2008-2011

Year	Type Of Clinic and Health Post				
	Type "A"	Type “B"	Type “C'	Type “D'	Total
2008	0	105	286	1912	2306
2009	0	110	411	2099	2608
2010	0	103	275	2097	2472
2011	0	103	253	2064	2415

Source: OPDC, 2008 -2011 EC.

2. Drinking Water

2.1. Introduction

The proverb "***water is life"*** is found in many cultures around the world. It underlines the fact that clean water is an absolute prerequisite for healthy living. The importance of water in human well-being cannot be over-emphasized. The normal functioning of the human body depends entirely upon an adequate quantity and quality of water.Potable water or improved drinking water is water that is safe to drink or use. It does not represent any significant risk to health over a lifetime of consumption, including different sensitivities that may occur between life stages (WHO, 2017).

The life of any community fully depends on the accessibility of adequate and safe water. Water safety and quality are fundamental to human development and well-being. Providing access to safe water is one of the most effective instruments in promoting health and reducing poverty (Wash & Program, 2018). In 2017, about 71% of the global population (5.3 billion people) used a safely managed drinking-water service that is, one located on premises, available when needed, and free from contamination and 90% of the global population (6.8 billion people) used at least a basic service(WHO, 2017).

In Ethiopia, 65% of households have access to improved water sources (Wash & Program, 2018). About 60 - 80% of communicable diseases are attributed to limited access to safe water and inadequate sanitation and hygiene services. In addition, an estimated 50% of the consequences of under nutrition are caused by environmental factors that include poor hygiene and lack of access to water supply and sanitation. In Oromiya region, there is limited access to drinking water. Only 63% of the population has access to drinking water in 2011 E.C, in spite of the large number of water resources available in the region. Although, 48% of households have access to an improved source of drinking water in 2003 E.C. Urban and rural households rely on different sources of drinking water.

In Oromiya, the three most common sources of drinking water in urban households are water piped into the household's dwelling, yard, or plot (0.9%); water piped into a public tap/standpipe (19%); and water piped to a neighbor (4.2%). By contrast, rural households obtain their drinking water mainly from public taps/standpipes (19%), followed by protected springs (14%) and tube wells or boreholes (13%) in 2009 E.C(EDHS, 2016).

In urban areas, 77% of households have piped water on their premises, compared with 6% of rural households (EDHS, 2016) in 2009 E.C. Fetching drinking water is an additional chore that could be of great cost to household members, depending on the time spent to obtain it. More than quarters of populations live in households (26%) travel 30 minutes or longer round trip to fetch drinking water. In both rural and urban households, adult women are most likely to be responsible for fetching drinking water (17% in urban households and 68% in rural households). Clean water is a basic need for human

life; however, most household in Oromiya do not treat their water prior to drinking (89%) in 2003 E.C which increased to 92% in 2008 E.C. Overall, 9% of households in Oromiya are using an appropriate treatment method in 2003 E.C which is reduced to 6.3% in 2008 E.C. Appropriate treatment methods include boiling, adding bleach/chlorine, straining through a cloth, filtering, solar disinfecting, and letting it stand and settle (EDHS, 2016).

The provision of safe and sufficient water supply and adequate sanitation services are indispensable components in the sustainable development of Oromiya urban and rural socioeconomic well-being. At present, most of the population does not have adequate and safe access to water supply and sanitation facilities. As a result, over 70% of the contagious diseases in the region are water borne/based diseases. Source of most of these diseases could be traced back to inadequate water supply and sanitation facilities. Providing access to clean and adequate Water supply and sanitation facilities and improving the performance of this subsector directly reduces the morbidity and mortality rates of the population. By the same token, it increases the productive capacity of the economically active populations, who otherwise, under conditions of scarcity, compromise their health and have to pay disproportionately high prices for water, thus perpetuating the poverty cycle.

2.2. Water Schemes

Water found from either improved or unimproved water sources. Improved sources are piped water from any location, tube wells or boreholes, protected dug wells, protected springs, rain water, bottled water, and water delivered by tanker truck or cart. For drinking water, improved sources are those that have the potential to deliver safe water by nature of their design and construction. According to the WHO/UNICEF Joint Monitoring Programme (JMP) 2017, an improved source should meet these three criteria: (i) it should be accessible on premises (ii) water should be available when needed (iii) the water supplied should be free from contamination. Packaged water (bottled water and sachets of water) and delivered water are now classified as improved but these were previously considered as unimproved as a result of lack of data on accessibility, availability and quality

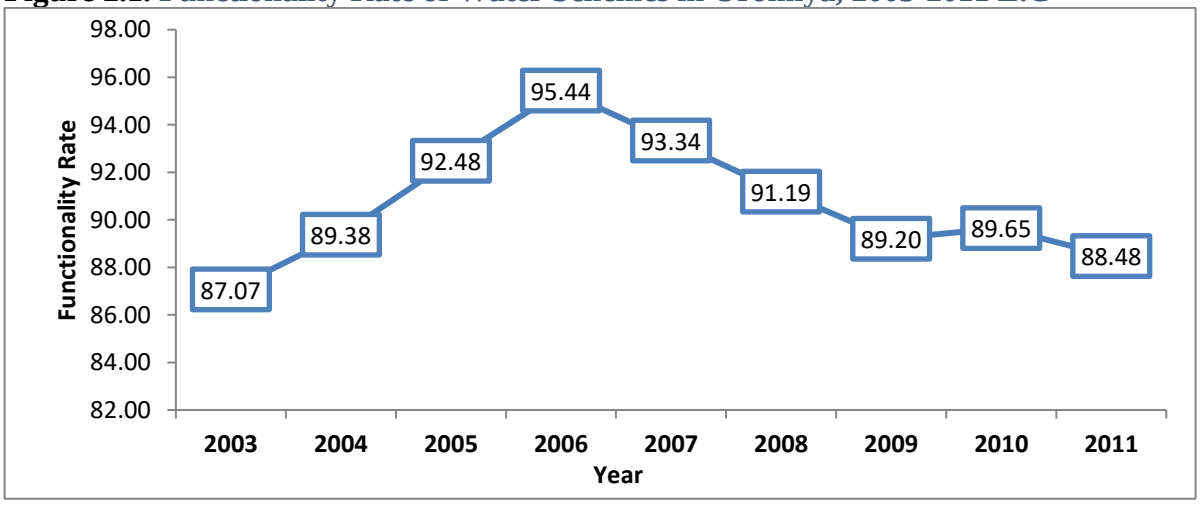
While unimproved sources are water collected from unprotected dug wells, unprotected springs and surface water. As defined by the Joint WHO & UNICEF Monitoring Programme (JMP), an unimproved drinking-water source is one that by the nature of its construction does not adequately protect the source from outside contamination, in particular with faecal matter. Unimproved drinking-water sources include: Unprotected (dug) well; unprotected spring, cart with small tank or drum; tanker truck-provided water, surface water (river, dam, lake, pond, stream, canal, irrigation channel); bottled water (because of potential limits on the quantity of water available to a household through this source, not the quality). Households use both improved and unimproved water sources for their daily water consumption.

In Ethiopia, the most common source of drinking water for the rural people is groundwater from borehole (deep wells), shallow wells and springs (Haylamicheal & Moges, 2014). Groundwater is usually consumed without any form of treatment. Oromiya region such as dam, river diversion, shallow wells, deep wells, spring on spot, hand dug wells and motorized spring are the main sources of drinking water. Among all water sources; spring on spot is the most widely used, accounting for about 56.9% of all potable water sources.

In Africa and other developing countries like Ethiopia, the sustainability of water supply is quite low with 30- 60% of the schemes becoming non-functional at some point after implementation(Guzha, 2006). In Oromiya region sustainability of water schemes especially of rural is a challenge, despite the improvement in the regional functionality rate which stands at 88% in 2011 E.C. While an increase in the number of water schemes that are functional, there is limited information on the reliability of these water sources. Operation and maintenance practices of the water sources remain poor and many gravities flow schemes and point water sources are not fully functional. The status of water schemes of Oromiya region in the last nine consecutive years (2003-2011) was indicated in figure 2.1 shows below, the functionality rate of water schemes was changing in the region from year to year with insignificant rate of 0.34% each year.

As the figure 2.1 below shows that the functionality rate of water schemes in Oromiya region in 2003 was 87% and in 2011 it has been raised to 88%. Functional water schemes were increased from 2003 to 2004 by 21%, from 2004 to 2005 by 39%, from 2005 to 2006 by 34% and from 2009 to 2010 by 1.6%. The average growth rate of functional schemes over regular time intervals for the past nine years were 13% growth each year. There were 66,147 water schemes in the region in 2010 E.C, of which 5,9302 (89.5%) were functional and 6,845 (10.3%) were non-functional. Number of water schemes has also increased from 23,658 in 2003 to 68,105 in 2011 E.C.

Figure 2.1. Functionality Rate of Water Schemes in Oromiya, 2003-2011 E.C



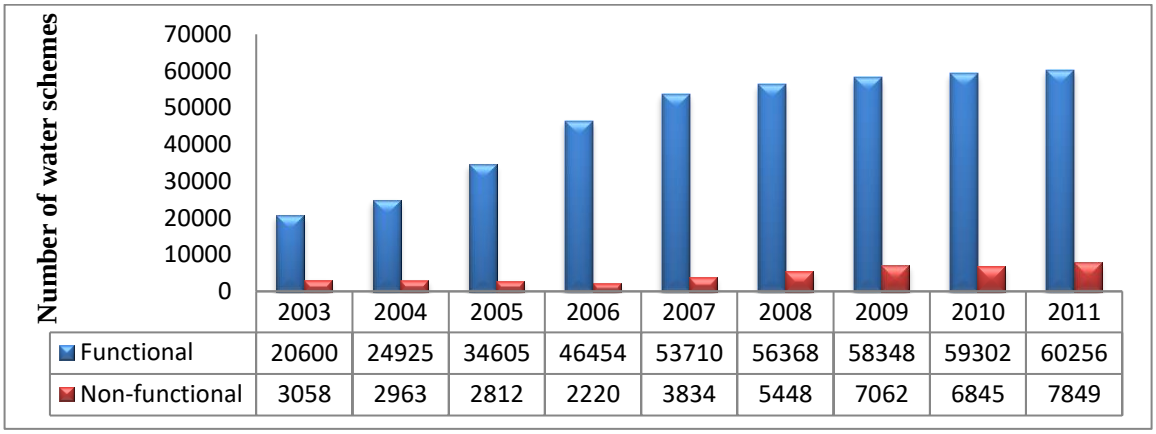
Source: Water, Mineral and Energy Bureau of Oromiya, 2003 – 2011E.C.

Measuring water service availability parameters is a challenge due to the complex range of outcomes associated. There are many factors, such as fee collection, access to post-construction support, and management arrangements associated with functional water points that help practitioners identify opportunities to improve service delivery. Few studies describe factors associated with functionality and patterns and trends in water point management in Ethiopia (Alexander, K. et al, 2015).

According to fFigure 2.2 below shows that the number of functional water schemes has increased from 20,600 in 2003 to 60,256 in 2011 E.C in the region. Likewise, the number of non-functional water schemes has increased from 3,058 in 2003 to 7,849 in 2011 E.C. The lack of community participation has been recognized as one of the reasons for low sustainability (Assefa, 2013). For example, limited involvement of the community at all stages of water development, the lack of a modest water service fee and a shortage of adequate skill and capacity to maintain water resources are specific aspects of community participation that have decreased sustainability of rural water supply (Mengesha A., Abera K, 2002).

All water supply providers in Ethiopia are currently following the principle of community participation and community management in the rural area. Request for improved water point, selection of the water point site, the technology type, the administration of the scheme's finances and procurement, the contribution of labor and cash during construction and the contribution of cash and labor for operation and maintenance are positive indicators of community participation at the initial and later phases of the water supply project(Assefa, 2013).

Figure 2.2. ***Functional and Non-functional Water Schemes in Oromiya, 2003-2011 E.C***



	2003	2004	2005	2006	2007	2008	2009	2010	2011
Functional	20600	24925	34605	46454	53710	56368	58348	59302	60256
Non-functional	3058	2963	2812	2220	3834	5448	7062	6845	7849

Source**:** *Water, Mineral and Energy Bureau of Oromiya, 2003 – 2011E.C.*

2.3. Types of Schemes

2.3.1. Spring

Springs occur wherever groundwater flows out from the earth's surface. Springs typically occur along hillsides, low-lying areas, or at the base of slopes. A spring is formed when natural pressure

forces groundwater above the land surface. This can occur at a distinct point or over a large seepage area. Springs are sometimes used as water supplies and can be a reliable and relatively inexpensive source of drinking water if they are developed and maintained properly. When considering using a spring as your source of drinking water, it is important to ensure that the rate of flow is reliable during all seasons of the year. Spring flow that fluctuates greatly throughout the year is an indication that the source is unreliable or may have the potential for contamination. It may be possible to learn about historical spring flow from the previous owner or a neighbor.

Water quality is also important to consider before using a spring as a water supply. Before developing the spring, collect a sample of water and have it analyzed at a local water testing laboratory to ensure that it can be efficiently and economically treated to make it safe for human consumption. Springs have variable flow so their low regime must be checked to determine whether it is sufficient for the demand. Low flows coincide with the very beginning of the rainy season or at the end of the dry season. According to Water Aid (2011), a flow of 0.1 liters per second (Lps) would result in a daily flow of about 3,000 liters which would supply a community of 150 people with their water requirements (20L per person per day).

However, an addition of a spring collection box or tank would allow even lower flows (< 0.1L) to be considered for water supply. Pollution is a serious concern during development and use. Therefore, the construction site should be selected where runoff cannot enter the spring; latrines have not been constructed upstream, and children and livestock are prevented from entering the site (Water Aid, 2011). Furthermore, the construction site should not experience saturation or subject to flooding and eroding processes (WaterAid, 2011).

2.3.2. Hand Dug Well

Hand dug wells (HDWs) are a common technology employed for rural water supply because of its relative ease in construction, low-cost input and its familiarity to most communities. Nowadays, the technology has been modernized by using better linings and more efficient pumps in order to improve a well's performance. HDWs are shallow ranging in depths up to 20 meters and approximately 1.5 meters in diameter, which accommodates the digging process. These wells most often are dug down to tap water stored in suspended water tables, clay or other impermeable layers on which percolated water collects above the main water table. The addition of a lining to the HDWs decreases the likelihood of a well collapsing and excessive loss from seepage. According to Water Aid (2011), four different linings have been suggested: pre-cast concrete caissons (cylinders), reinforced concrete, brick, and galvanized iron. When using caissons, the initial concrete cylinder is pressed into the excavation site and the soil

extracted from within the cylinder, and as the depth of the well increases, concrete caissons are added as the depth increases (Water Aid, 2011). However, caissons of smaller diameters should be used when the well reaches depths below the water table (Water Aid, 2011). Gravel is used to line the base of the well and to pack the sides of the concrete cylinders in order to prevent sand, silt and other materials from entering the well water (Water Aid, 2011).

Finally, to prevent surface runoff from flowing over into the well, an apron of concrete or puddle clay is constructed around opening, and a concrete slab is used to cover the well (Water Aid, 2011). Bucket and rope, hand pump or another mechanized pump can be used to extract the water.

2.3.3. Shallow well and Borehole

Shallow well means that your water source is relatively close to the ground's surface. Your local water well drillers will measure the water table and calculate to what depth the well should be dug. This involves projecting the low point of the water table over the course of a year, including drought conditions. Shallow wells typically are less expensive to drill because there's less labor and fewer materials involved. You'll need a shallow well pump for wells of 25 feet or less. But these pumps aren't submersible. Instead, they're placed in a well housing. They'll sometimes come with features to keep the motor from burning out.

Shallow wells are deeper than 30 m but lesser in depth than boreholes which are much deeper (up to > 100m) and have a smaller diameter, approximately 100 to 150 mm (Water Aid, 2011). Boreholes or shallow wells often reach the main aquifer where sufficient water can be obtained. However, pumping is the only option to extract the water from these wells. Similar to HDWs, a borehole will have an internal lining, an apron and cover for situating a pump. Hand or other mechanized pumps must be installed to extract the water because of a borehole's depth.

2.3.4. Hand Pumps

Hand pumps are installed on hand-dug, shallow and deep wells in order to lift water from below the ground surface to the users at the surface. A bucket and rope system are the traditional lifting device but requires excessive effort and strength to lift the water, entails frequent replacement, and subject to pollution both from the ground surface and the bucket and rope. A hand pump is composed of a pumping arm, a piston or plunger, valves, pump rods and pump cylinder. The arm is pumped by hand and drives the piston and pump rods up and down within the pump cylinder causing the different valves positioned

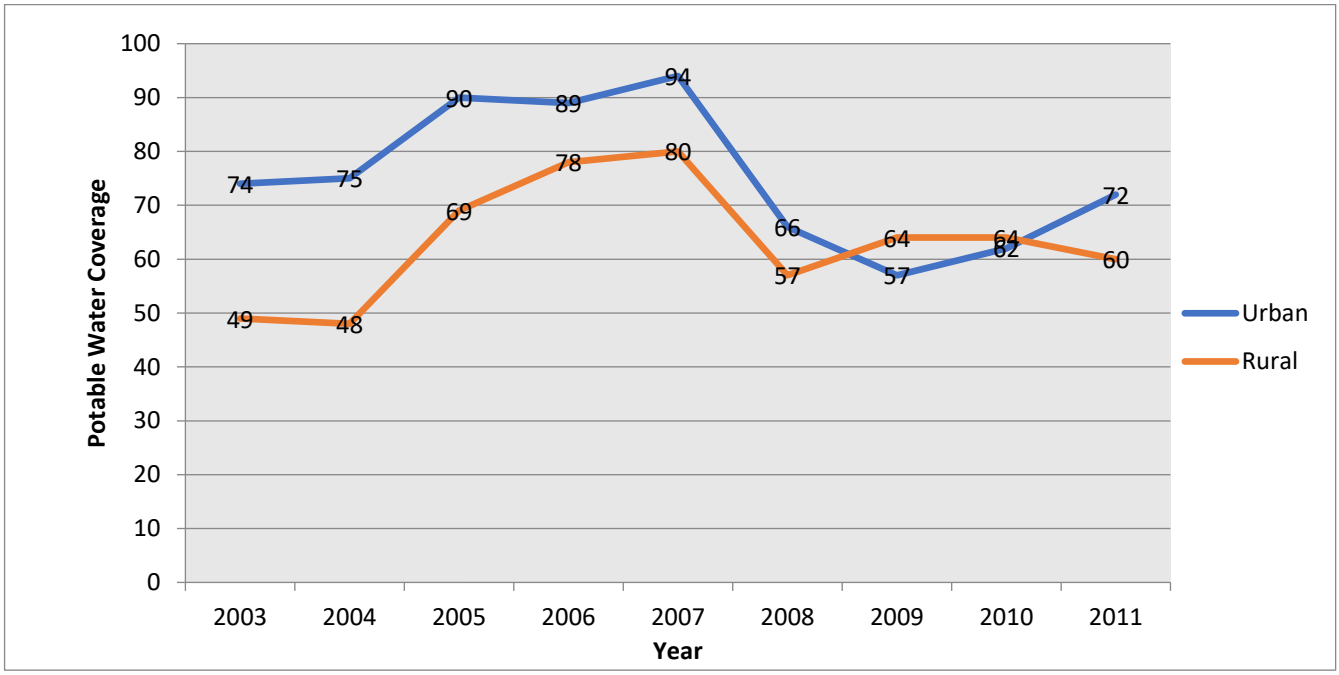
above and below the piston to open and close depending on whether water is being pulled in or pushed up (Water Aid, 2011). Several types of hand pumps exist and are used throughout rural Oromiya.

2.4. Potable Water Coverage

The proportion of population using an improved drinking water source is the share of the population that uses any types of improved drinking water supplies. An improved drinking water source is a facility that, by nature of its construction, is protected from outside contamination in particular from contamination with fecal matter. Use of an improved drinking water source is a proxy for measuring access to safe drinking water. Improved drinking water sources are more likely to be protected from external contaminants than unimproved sources either by intervention or through their design and construction. Greater access to improved drinking water sources is important as it contributes to lowering the incidence of many diseases in developing countries. This indicator does not specify a minimum available amount of water per capita per day, nor does it specify a distance to the source expressed either in the amount of time required to collect water or the actual distance in meters.

In Oromiya region, the coverage of clean drinking water was 74, 49 and 54 percent in urban, rural and at the regional level respectively at beginning of the Growth and Transformation plan (GTP I) in 2003E.C. Whereas at the end of the first Growth and Transformation Plan (GTP I) 2007 E.C, the coverage of clean drinking water supply was 94, 80 and 88 percent in urban, rural and the total coverage in regional level respectively. This was through providing 15 liters of clean water per person in a day within the radius of 1.5 Kilometer at the rural level and 20 liters of clean water per person in a day within the radius of 0.5 Kilometer at urban areas. The second Growth and Transformation Plan (GTP II) was planned to put the nation at the level of the middle-income countries and new standard was formulated for the clean drinking water supply coverage. Since then, the standards are implemented efficiently. According to the new standard of GTP II the rural clean drinking water coverage grows to 25 liters of clean water per person in a day within the radius of one kilometer at the rural level which makes it 57 percent at the start of the plan 2008 E.C. Out of this, 20 percent will be from tap water. Similarly, the urban clean water supply is planned to be 100 liters per person in a day at the first-grade towns. As well as, 80 liters, 60 liters, 50 liters and 40 liters at the second, third, fourth and fifth grade towns respectively. This takes the urban clean water coverage was 66 percent in 2008 E.C. The majority of the population in the region (mainly in rural areas) uses unprotected water, such as spring water; boreholes, hand dug wells, rivers, lakes and rain water. Similarly, about 75, 48 and 57% of the urban, rural and total population of the region respectively had access to water supply in 2004 E.C. The indicated year water coverage of the region is almost similar to the national level, i.e., 78, 55 and 58 percent respectively.

Figure 2.3 *Potable Water Coverage of Oromiya Region, 2003-2011 E.C*



Source: Water, Mineral and Energy Bureau of Oromiya, 2003 – 2011E.C.

Potable water coverage has been increasing both in the rural and urban areas of Oromiya. In 2011 E.C., about 63% of the total population and similarly 60 % of rural and 72% of the urban population had access to potable water supply in the Region. This means, out of the 37 million population of the region, 23.7 million or 63 percent of the population are benefitted from the clean drinking water supply in 2011 E.C. The data reveals that the potable water coverage of the region has increased between 2003 and 2007. As the data shows that the potable water coverage of the region was increased from 54 percent in 2003 to 88 percent in 2007. However, the potable water coverage of the region has declined after 2007E.C. Generally, there was uneven trends of portable water coverage between 2003-2011in the region.

According to Water, Mineral and Energy Bureau of Oromiya data indicates that the water supply coverage for rural residence was 49 percent in 2003 E.C. Over the time of between 2003 and 2007 E.C., the potable water coverage of rural Oromiya has increased from 49 percent in 2003 to 80 percent in 2007 E.C. Between 2008 and 2011 E.C., the potable water coverage of rural Oromiya has increased from 57 percent in 2008 to 60 percent in 2011.Besides, Ethiopian Demographic and Health Survey report indicates that the distribution of water supply technologies across rural communities for 2009 was mainly from rural pipe system (3 per cent); public taps/standpipes (19 per cent); protected springs (21 per cent); tube wells or boreholes (13 percent); while the remaining 43 per cent is from unprotected sources. By 2008 E.C study indicates that access to improved drinking water for rural areas is 57 per

cent, mainly from public taps/standpipes (19 per cent), followed by protected springs (14 per cent) and tube wells or boreholes (13 per cent).

In Oromiya region more than half of rural households (53 per cent) travel 30 minutes or longer round trip to fetch drinking water, as compared with 13 per cent of urban households. Overall, 20 per cent of households in Oromiya have water on their premises (77 per cent in urban areas versus 6 per cent in rural areas). As figure 2.5 below shows that during GTP I and GTP II (2003-2011) improved water supply has increased from 49 per cent in 2003 to 60 per cent in 2011 E.C. The trend shows potable water coverage in the region was increasing through the indicated year with in different standard.

As in the above **Error! Reference source not found.**2. 3 indicates that 74 per cent of the urban population had access to improved water supply during 2003 E.C as per GTP I standard, with 56 per cent having water piped onto the premises, and 37 per cent from other improved sources. By the same year 7 per cent of the population in urban areas were using unimproved water supply, mainly surface water. On the other hand, between 2003 and 2007 E.C., the potable water coverage of urban Oromiya has increased from 74 percent in 2003 to 90 percent in 2007. Between 2008 and 2011, the potable water coverage of urban Oromiya has increased from 66 percent to in 2008 to 72 percent in 2011.

The SDG indicator of a "safely managed" urban water supply, however, sets a higher standard in terms of level of service. The need for rehabilitation (combined with service delivery improvement) compared to new construction is likely to be higher in urban areas when cost-benefit is considered. The average for urban areas is reported to be about 64 per cent with GTP II standard. The number of towns supplied with potable water was 308 in 2003 E.C, and this has increased to 594 in 2011 E.C. The number of towns supplied with potable water has been tremendously increasing in the Region.

2.5. Drinking Water Coverage Gaps in Place of Residence

As per urban-rural disparities concerning to safe drinking water, out of the world population who lacked to safe drinking water, about 84% were living in rural areas. The result of the analysis shows that, there was a gap between urban and rural potable water coverage in Oromiya in 2011 E.C. As shown on Figure 2.3 drinking water coverage was 60% in rural and 72% in urban in 2011 E.C. This shows that there was about 10% gap between urban drinking water coverage and rural drinking water coverage. Public investment in Ethiopia has a strong urban bias, despite the fact that 83 % of the country's poor live in rural areas (WASH, 2011). Evidence on the urban-rural gap in drinking water in Oromiya is scarce. In Ethiopia, 97% of urban households have access to an improved source of drinking water, as compared with 57% of rural households according to 2016 demographic health survey. There are clear disparities between urban and rural Oromiya (Figure 2.3). Between 2003 and 2011 E.C, access to improved water supply of urban areas of Oromiya was more than rural Oromiya. By and large, among the 25 countries

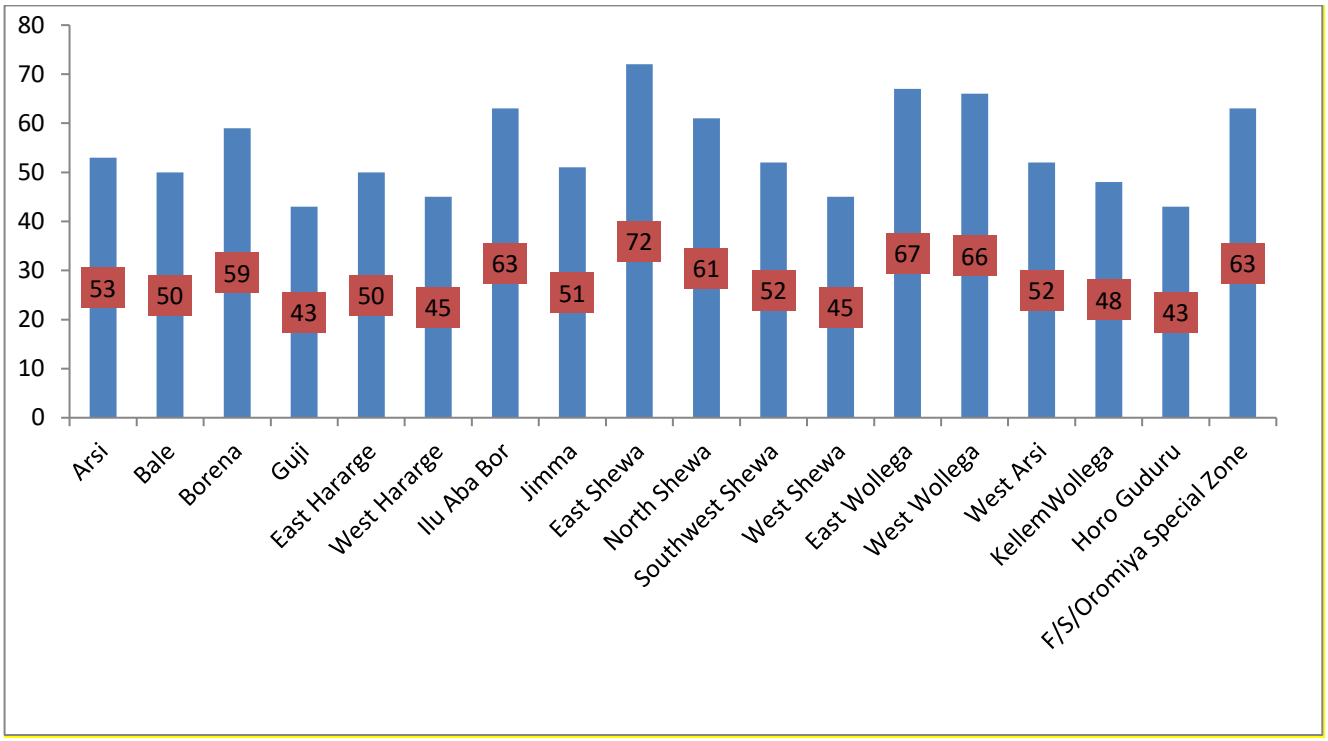
in Sub-Saharan Africa, Ethiopia in which the percentage point gap between use of improved drinking water in urban and rural areas is more than 25%. Most rural populations in the region rely heavily on basic systems, and if the trend continues rural areas may fall even further behind urban areas. The rural challenge remains daunting and, at this pace, it will take considerable time and effort to cover the remaining without access to an improved drinking water source, and to ensure continued access for those who have.

2.6. Drinking Water Supply by Zones

Among the 20 zones of the region around 12 zones had potable water coverage below that of the region's potable water coverage (54%), while 8 zones had above the region's drinking water coverage in 2003 E.C. Those Buno Bedele and West Guji zones were not know as an administrative zone before 2009 E.C. Therefore, its data were included in the former zones. In access to improved drinking water coverage of Oromiya zones range from lowest Bale (40%) to the highest East Wollega (79%) zone in 2011 E.C. According to Figure 2.4 below depicts trends a potable water coverage in Oromiya zones. There is great variation from zone to zone and the difference ranges from the lowest Borena 41% to the highest North Shewa 85% in 2010 E.C. The gap between the highest and lowest drinking water coverage was almost double. Average drinking water coverage of the 20 zones of Oromiya in 2010 was about 60%.

In 2003 E.C, about 12 Zones of the region had potable water coverage below that of the region's potable water coverage (64%), while 8 zones had above the Region's drinking water coverage. Buno Bedele and West Guji were not formed before 2009 E.C. therefore their data were included in the former zones.

Figure 2. 4 Drinking water Coverage of Oromiya zones, 2003



Source: Water, Mineral and Energy Bureau of Oromiya, 2003 – 2011E.C.

2.7. Social Services Institutions Supplied with Potable Water

The number of social services institutions supplied with potable water were 4,446 primary schools had access to improved water supply and 830 health facilities had access to improved drinking water in 2006 E.C. Similarly, in 2007 E.C of the total 12,479 primary government schools only 4,912 schools had access to improved water supply. This shows that there is a gap in this area and needs more effort to make potable water accessible for all schools of the region. By 2011 number of health institution's access to improved water supply were 2143, in the same year number of school's access to improved water supply were 3851.

2.8. Progress Towards Target Drinking Water Coverage

According to the United Nations sustainable development goals, by 2030 achieve universal and equitable access to safe and affordable drinking water for all (WHO, 2019). Ethiopia has made tremendous progress toward universal drinking water access in the past decade, but still significant challenges remain unaddressed which varies from place to place. In 2015, the Government ratified the 2030 Agenda for Sustainable Development Goals. Ethiopia plan to reach the United Nations sustainable development goals (SDG) of ending of unsafe drinking water by 2030, achieving 100% coverage of potable water. On the other hand, Oromiya region plan to reach an average of 94.6 percent at the end of 2030 (OPEC, 2020). Oromiya requires a 3.16 percent average annual rate of change to achieve the SDG 2030 target of 94.6 percent coverage. But the current annual rate of change is below one percent which

is far below the expected annual rate of change. So, Oromiya is off-track to reach the United Nations SDGs of ending of unsafe drinking water by 2030. Therefore, Oromiya should rapidly scale up and promote investment on water supply infrastructure and also identify the major constraints of water supply in Oromiya such as inadequate finance, inadequate manpower, weak coordination among the offices, failure to implementing the policies effectively as it was written on the paper, lack of other institutions that involve in the provision of water service, rapid population growth, failure to mobilize the community.

3. Oromiya Regional Road Facility

3.1. Introduction

Road's network is clearly related to critical enabling conditions for improving living in different rural parts of the country. However, the distribution of socioeconomic benefits resulting from a rural road is considered an inherent mechanism to ensure the benefits may be distributed equitably between the poor and the non-poor in communities (Mushir, 2013; Buys et al., 2010; Bekele, 2007; Ali & Meaza, 2020). The classification of roads based on speed and accessibility is the most generic one. As the accessibility of road increases, the speed reduces. Accordingly, the roads can be classified as follows in the order of increased accessibility and reduced speeds. Such as freeways, express ways, highways, arterials, local streets and collector streets (Wolhuter, 2015).

Road is line of communication (a travelled way) using a stabilized base other than rails or air strips which is open to public traffic or a line which serve primarily to provide services (IRF). It is one of the major factors determining the socioeconomic variables such as education, health, economic activities, and social services (Ayele, 2017).Road Communication plays a crucial role in promoting economic, social and cultural development of a region. Their importance has always been recognized and found from the history that once road communication is given the development of civilization, their quality and quantity have improved significantly.

Thus, the road is one of the great fundamental institutions of mankind. It develops with man's advance. In the modem world; roads have proved to yield profound economic and social significance (Kantharajappa, 1998, Ayele, 2017).Roads are clearly related to critical enabling conditions for improving living in different rural parts of the country. However, the distribution of socioeconomic benefits resulting from a rural road is considered an inherent mechanism to ensure the benefits may be distributed equitably between the poor and the non-poor in communities (Mushir, 2013; Buys et al., 2010; Bekele, 2007, Ali & Meaza, 2020).

Ethiopia has three types of road institutions: The Federal Roads Authority responsible for federal roads, the Regional Roads Authority responsible for regional roads and the Woreda rural roads office at district level responsible for community roads. Only 37 per cent of the total numbers of kebeles (the smallest Administrative Unit) have access to major roads in the country. The country has formulated the Universal Rural Access Plan (URAP), which aims to connect all kebeles (the smallest administrative Unit) by all-weather roads (Bhandari, 2013).

There is strong evidence that the greatest benefits from transport investment (for individuals and national GDP) come from connecting villages to the road network. Evidence from Ethiopia, Ghana, Nepal, and Uganda and elsewhere shows that upgrading footpaths to basic motor able roads provides very substantial benefits. It is however necessary to ensure that the roads are maintainable. The same source

advises that analyses from China showed that the greatest returns to investments came from the construction of low-volume rural roads. The investment in such roads had a greater influence on poverty reduction and national GDP than investments in better quality, higher volume roads. Investment in rural roads, particularly the initial connectivity, leads to greater school enrolment (evidence from many countries including Bangladesh, Ethiopia, India, Morocco, Pakistan and Vietnam). Investment in rural roads also leads to better staffing at village primary schools (evidence from India, Zambia and elsewhere) (Cook et al., 2013).

In terms of total road length, Oromiya with 8354 km is the first (31.33% of the total road stock in the country) followed by SNNP region that has 7482 km (28.06%) in 2013. Oromiya has performed 2.3 times greater than Amhara, which is expected to have its own implications in terms of socio-economic impacts in the respective regions (Dagnew Bogale, 2016).

3.2. Ethiopia Governing Principles of Road Sector Development Programme V

Governing principles of RSDP V emanate from Macroeconomic indicators, development policies and strategies, lessons derived from implementation of past RSDPs and experience of other countries. Governing principles of RSDP V are equity, sustainability, convenience and safety, productivity and competitiveness.

Equity: Improving rural accessibility and reducing and ultimately eradicating poverty is one of the major objectives of road sector development. Fair distribution of roads among different regions in the country is essential for economic growth and poverty reduction. New trunk and link road construction projects are fairly distributed across regions based on population, area and other criteria to ensure equitable distribution of federal roads.

Sustainability: Sustainability of development efforts in all sectors is crucial to achieve the development objective of the country. Without sustainability of economic and social activities; economic growth and social development cannot be achieved. Sustainability of roads and road projects has to be ensured through timely and adequate maintenance of roads by road agencies. Road agencies need to be sufficiently principled to make sure that they can carry out timely and adequate maintenance before they build new road. Sustainability of institutional capacity building of road agencies at Federal, Regional and woreda level is also given attention in RSDP V.

Quality: Growth of traffic on trunk and link roads and the demand of the public for better roads and change of technology are factors behind for steady improvement in the quality of roads priority is given to improving the quality of the road network.

Productivity and Competitiveness: Productivity in the construction industry in general and the road industry in particular is low, due to low productivity of construction labor and equipment. Low productivity of local contractors and consultants prevented them from tendering for big and complex road construction projects and consultancy services to address the low productivity and competitiveness in the sector. The effectiveness of implementation improved under RSDP V to help raise the productivity and competitiveness of the domestic construction industry. (Ministry of Transport, 2015).

3.3 An Overview of Oromiya Regional Road Facility

Roads are constructed primarily to allow vehicles to easily travel from one point to another. Road transport is a route between two destinations, which has been either paved or worked on to enable transportation by way of motorized and non-motorized carriages. There are many advantages of road transport in comparison to other means of transport. The investment required in road transport is very less compared to other modes of transport such as railways and air transport. The cost of construction, operating cost and maintaining roads is cheaper than that of the railways.

The total stock of road network of Oromiya region was 43,548 km of which 3615 km was asphalt and the remaining 39,933 km was gravel road in 2004 E.C. The All-weather Road network has reached to 48,524 km in 2011. On average, the network has been growing at a rate of 22 percent per annum over the period 2004-2011 E.C. In the region; network roads had played a great role in both rural and areas. By 2011, the regional all weather rural roads were reached 43,479 km which accounted 90% which has a lion share while the urban all-weather roads were reached 5,044 km so as to accounted 10% from the total 48,524 km of regional all-weather roads.

Table 3.1 Oromiya Region Road by Type in kiloMeter,2004-2011

Year	Asphalt	Gravel	Asphalt & Gravel	All weather Road	Dry weather Road
2004	3615	39,933	43,548	19,360	32,767
2005	3934	18,847	22,781	25,044	29,362
2006	3856	31,433	35,289	25,312	24,106
2007	4392	34,967	39,359	36,532	19,440
2008	4524	42,726	47,250	41,313	20,900
2009	4951	43,240	48,191	46,971	23,596
2010	4921	40,655	45,576	47,487	17,070
2011	5092	42,012	47,104	48,524	17,750

Source: OPEDO, Statistical Abstract 12th to 19th (2013 – 2020)

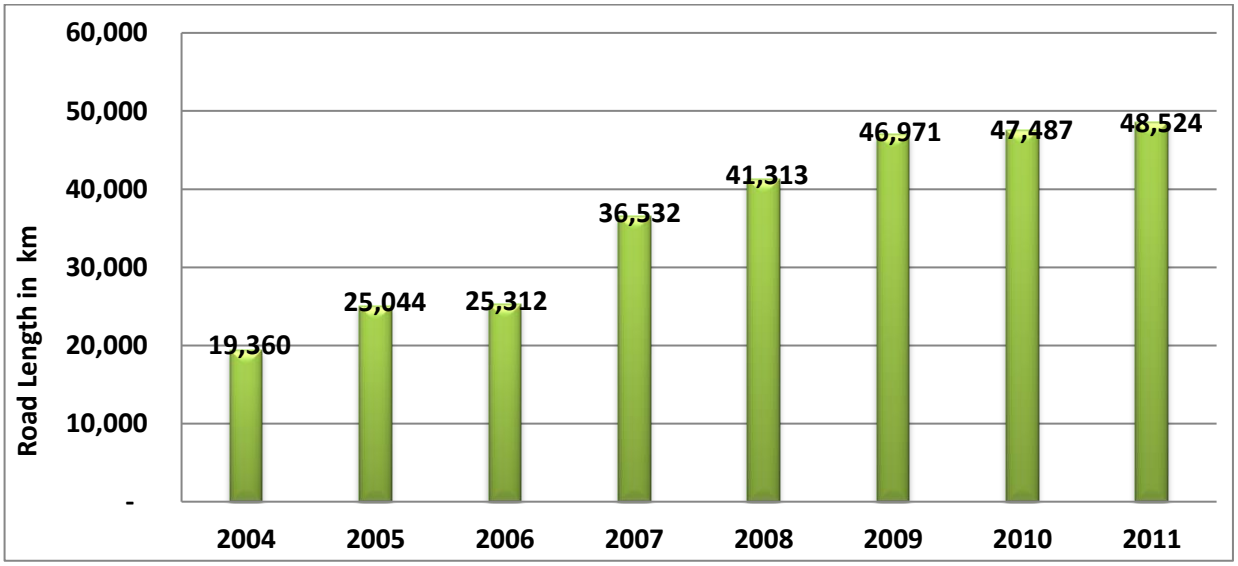
Although the contribution of Asphalt and gravel road had played a great role in the accessibility, the incremental rate in km was different year to year. Accordingly, it illustrated in the table 3.1above indicates, the annual average percentage incremental of asphalt and gravel road was 10% and 84% between 2004 and 2011E.C respectively. This indicated that in the region, gravel had 8% more contributed than asphalt road as the data illustrated in the table 3.1. Similarly, both asphalt and gravel roads have different contribution in the all-weather road in km. The annual average incremental in percentage of asphalt road was 13% although that of the gravel road was 109% when it computed from all-weather roads over the periods of 2004-2011 E.C.

Depending on types of classification, the annual average incremental percentage of the total asphalt and gravel road indicated 13% and all-weather roads was 23%. However, the annual average percentage of dry weather roads was declined by 27% in the year 2004-2011 E.C.

3.4 All Weather Road

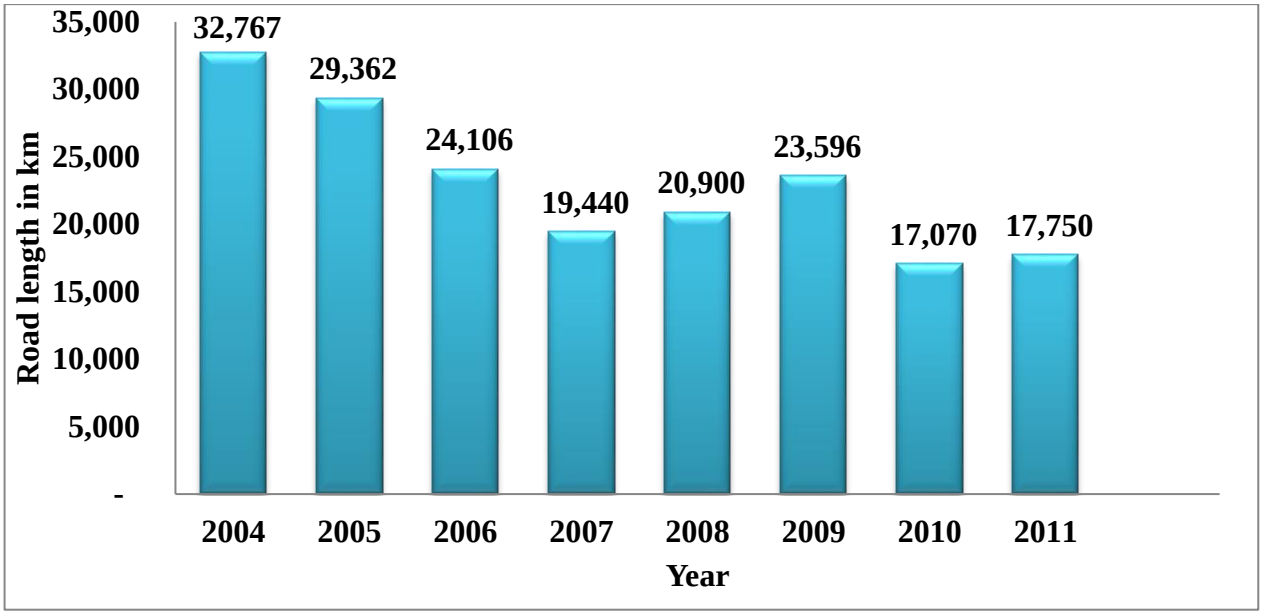
All Weather Road is a road that is trafficable in all weather conditions. Typically, this means a road that is constructed in such a way that excessive rain does not cause it to be flooded or sodden to such an extent that vehicles travelling over it are likely become bogged.

Figure 3.1 All Weather Road of Oromiya, 2004-2011 E.C.



In the region, the all-weather road length has increased time to time with an average annual incremental of about 23 % per year from 2004 to 2011 EFY. The all-weather roads length was increased by 23% between 2004&2005 and by 31% between 2006&2007. According to figure 3.1 below indicate, when it has compared to both in the year between 2004 & 2005, and 2006 & 2007 it was decreased in percentage wise.

Figure 3.2. Dry Weather Road in Oromiya Region,2004-2011E.C



The dry-weather road length has declined gradually year to year with an average annual incremental manner of about 27 % per year from 2004 to 2011 EFY in the region. In the region, the decrease at increased rate of dry weather road (2004-2011) was indicated in different percentage. The dry-weather roads length was declined by 22% in the year 2005&2006, by 24% in the year 2006&2007 and by 38% in the year 2008 & 2009 respectively.

According to figures 3.1 and 3.2 in the above indicates, based on the two types of roads such as all-weather road and dry weather roads classification all-weather roads were increased from 19,360 to 48,524 km while the dry weather roads were declined 32,767 to 17,750 km in the year 2004-2011.The indication that the all-weather road and dry weather road increment has opposite way.

3.4.1 Road Network Expansion and Pavement in Ethiopia

As a result of huge investments under RSDP I, II, III, and IV, the current road stock (in 2013) has reached 85,966km, of which 11, 301km (13.15%) is paved. According to a World Bank study (2014), the density of paved roads per 1,000kms in Ethiopia (8 kms) is below the average of low-income countries. The selected low-income and less populated countries with the share of paved road in this study are Nigeria (31kms), Cameroon (9kms), Vietnam (423kms), Madagascar (10kms), Kenya (19kms), Cambodia (13kms), and Algeria (36kms) (World Bank, 2014; Dagnew Bogale, 2016).

3.4.2 Road Density Status of Ethiopia with Low- and Middle-Income Countries

The Government of Ethiopia understands the limited road network coverage and poor condition of the road network, which have been an impediment to the reduction of poverty and promoting economic growth in the country. As a result, the Government launched the Road Sector Development Programme

(RSDP) in 1997, which aims to restore the road network to acceptable condition and increase road density in the country (UN,2020). Accordingly, the average road density for the low-income 3 countries is 39.5km per 1000 km^2, whereas Ethiopia's road density at 49km per 1000 km^2 is greater than the average of low-income countries.

The average road density for the middle-income countries is 104.7km per 1,000 km2, which is twice higher than that of Ethiopia. The average density in high-income countries is 167.6km per 1,000 sq km, which is about 3.4 times higher than that of Ethiopia. However, the road density in very high income countries (315.8km per 1000 km2) is about 6 times higher than that of Ethiopia (Dagnew Bogale, 2016).

3.3.2 Regional Comparisons of Road Growth and Induced Density Changes

Data on changes in road density shows significant differences across the various regions. The comparison is made baring urban centered regions like Addis Ababa, Dire Dawa and Harari National Regional states. Accordingly, Amhara Region is found to have very low road density as compared to other regions during the last seven years. Amhara Region has performed the road density of 0.15, 0.2 and 0.38 in 2007, 2010 and 2013 G. C respectively. Whereas sparsely populated regions like Gambella and Afar have high road density. In terms of total road length, Oromiya with 8354 km is the first (31.33% of the total road stock in the country) followed by SNNP region that has 7482 km (28.06%) in 2013. Oromiya has performed 2.3 times greater than Amhara, which is expected to have its own implications in terms of socio-economic impacts in the respective regions (Dagnew Bogale, 2016).

3.3.2 Impacts on Road Network Quality in Ethiopia

Better access to roads could have a considerable role on economic growth in the country especially for countries which have very low initial road density. The share of the road network categorized under good condition had increased from 22 percent in 1997 to 70 percent in 2013**.** In other words, during the first year of RSDP, 52 percent of the road network was found to be in poor condition and only 22 percent was in reasonably good condition. The proportion of roads in good condition has overtaken the proportion of roads in poor condition from 2004 onwards (Dagnew Bogale, 2016)

Another observation is that the roads in fair and poor condition are consistently declining shifting to good condition since 2002. This change is mainly linked with the rapid expansion of roads with better standards as well as better attention given to road maintenance (Dagnew Bogale, 2016)

In general, interventions made to standardize and maintain roads had contributed for further improvements in the quality of roads. Yet, the World Bank study (2014) mentioned above pointed out that the density of paved road of Ethiopia still remains far below the standard of 260 middle-income countries in 2013. When changes in road condition over time are viewed in terms of their classification, that is asphalt and gravel roads, it shows improvement in good condition from 17 to 74 percent and from

25 to 55 percent between 1997 and 2011 respectively (RSDP III- 2009, ERA, 2014), Dagnew Bogale, 2016).

Improving the condition of the road network was a challenge. In the first year of the RSDP 52% of the road network was in poor condition (Most motorists and transporters face a lot of inconvenience and hardship due to bad roads). The poor road conditions have increased the vehicle maintenance costs of transporters and only 22% was in good condition (Good roads help people to travel easily to places where they can work and to develop their lands and industries). The rehabilitation, upgrading and maintenance intervention efforts under RSDP have improved the proportion of the road network in good condition till 2018, while slight decline rate in 2020 to 26.1 percent, the remaining poor condition increase to 41.4 percent. Roads in fair condition are consistently declining. The trend in the condition of the classified road network during RSDP from 1997 to 2020.

Table 3.2 Oromiya Region Road Density of Population and Land Area in km^2

Year	All weather Road	Population Number	Road Density /popn	Area in km^2	Road Density /Land in km
2004	19,360	27,062,884	0.72	363,378	53
2005	25,044	32,065,118	0.78	363,378	69
2006	25,312	32,976,589	0.77	363,378	70
2007	36,532	33,999,815	1.07	363,376	101
2008	41,313	34,895,670	1.18	363,376	114
2009	46,971	35,855,163	1.31	363,376	129
2010	47,487	36,913,256	1.29	363,376	131
2011	48,524	37,955,939	1.28	363,376	134

Source: Computed by the author based on Data of OPDC, SA Yearly published.

According to table 3.1 above indicates, the all-weather road of the region was increased from 19, 360 to 48,524 km in the year of 2004-2011 E.C**.** The average percentage increment of the all-weather road of the region was 23% in the given years. The road density of the region was computed from the all-weather road based on population number and the total land area of the region. Thus, the road density per population increased from 0.72 in 2004 to 1.28 in 2011 E.C, the average percentage increment indicated 19 % whereas the road density per total land area of the region was increased from 53 to 134 km. the average percentage increment accounted 23% when both road densities were computed based on the all-weather road up to 2011E.C in the region.

3.4. Types and Facility of Regional Roads by Zones

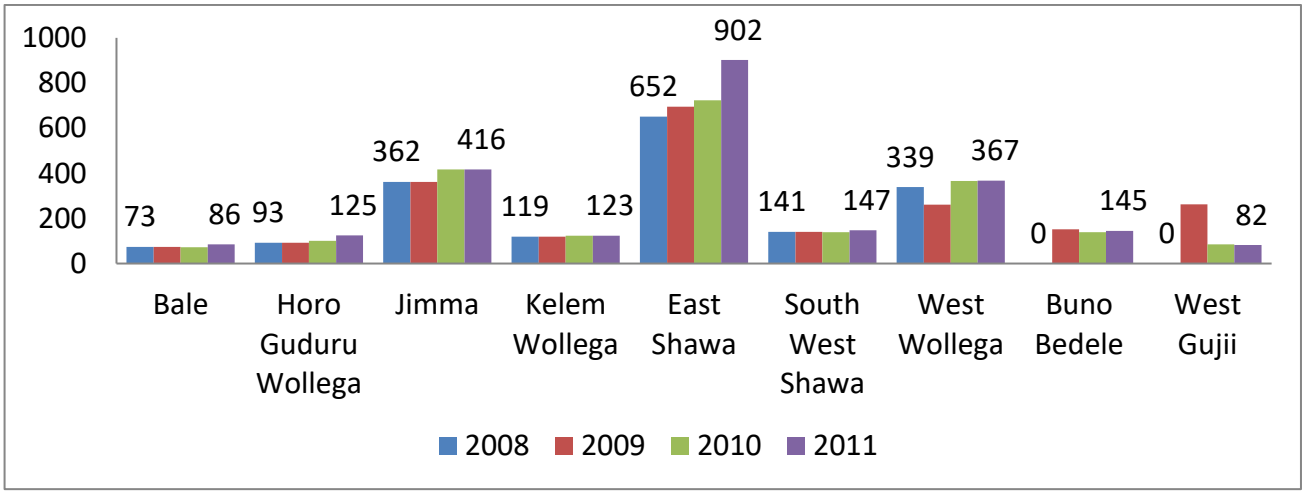
3.4.1. Asphalt Road

The average asphalt road distance of the region was 251 km coverage in 2009. Among the total 18 zones of the region 10 zones have less than the average distance of the region asphalt road in km; Such as Arsi,

Bale, Guji, East Hararge, West Hararge, Horro Guduru Wollega, Kelam Wollega,South West Shawa and East Wollega.The average asphalt road distance of the region was 248 km in 2009. Among the total 20 zones of the region 10 zones have less than the average distance of the region asphalt road in km; Such as Arsi, Bale, Guji, East Hararge, West Hararge, Horro Guduru Wollega, KelamWollega, North Shawa, South West Shawa, East Wollega and Buno Beddele.

On the other hand, the average asphalt road distance of the region was 246 km in the year 2010. From the total of 20 zones of the regional 13 zones have less than the average distance of the region asphalt road in km; Such as Arsi, Bale, Guji, East Hararge, West Hararge, Horro Guduru Wollega, Ilu Aba Bora, Kelam Wollega, North Shawa, South West Shawa, East Wollega, Buno Beddele and West Guji. Still yet, the average asphalt road distance of the region was 255 km in 13 zones of the region mentioned in the above in 2011E.C. Asphalt Road, the least distance road, Bale and West Guji Zones have less than 100 km each. For example, Bale Zone of the asphalt road was constant for the last three years from 2008-2010 but it increased by 15% to 86 km in 2011. By 2011, Bale Zone ranked the second least distance next to West Gujii zone in which it compared as in the regional asphalt road, as compared in between 2008-2011years. On the other hand, East Shawa zone has got an opportunity to increase the Asphalt Road from 652 to 902 km which was an increase by 28% between 2008-2011years.

Figure 3.3. Asphalt Roads by Zones of Oromiya, 2008-2011E.C



Source: Computed by the author based on Data of OPED, SA Yearly published

3.4.2. Gravel Road

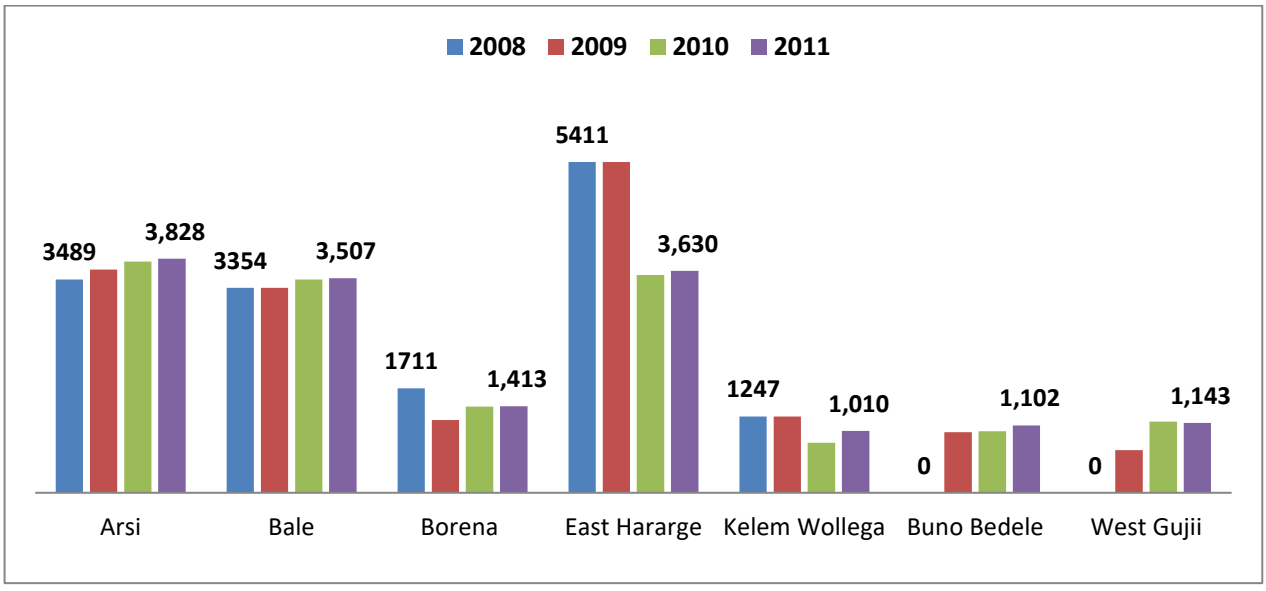
Gravel roads account for a large portion of the rural roads in Ethiopia. Gravel roads are often considered to provide lower quality service than paved road surfaces. Yet, in many rural regions, the volume of traffic is so low that paving and maintaining a paved road is not economically feasible. Budget

constraints are causing some agencies to revert failing paved surfaces to gravel surfaces. Consequently, understanding gravel road design, construction, and maintenance is very important.

In 2008 E.C, the average gravel road distance of the region was 2136 km. By and large, almost 56% regional zones or about 10 zones have less than the average distance of the region gravel road in km out of the 18 zones. Such zones includes West Arsi, Borana,West Hararge, Jimma, Kelam Wollega, Horro Guduru Wollega, North Shawa, South West Shawa, East Wollega and West Wollega. Whereas 8 zones of the region have more than the average gravel road distance in the year. The average gravel road distance of the region was 2162 km in 2009 E.C. Eight zones such as Arsi (3652), Bale (3354), Guji (2590), FSOSZ (3196), East Hararge (5411), Ilu Aba Bor (2783), West Shawa (3600) and West Wollega (3600) have more than the average distance gravel road where as the rest 11 zones of the region has less than that of the average distance of gravel road in km out of the 19 zones.

The average gravel road distance of the region was 2033 km in 2010 E.C. Nine zones such as Arsi , West Arsi , Bale, FSOSZ, East Hararge, Jimma, East shawa, East Wollega and West Wollega have more than the average distance gravel road in km out of the total zones that covers 45% the region's zones. But the rest 11 zones of the region have less than the average distance of gravel road in km that it accounted by 55%.

Figure 3.4. Gravel roads by Zones, 2008-2011 E.C.



Source: Computed by the author based on Data of OPED, SA Yearly published

The average gravel road distance of the region was 2,101 km in 2011 E.C. In the region, 10 zones like Arsi, West Arsi, Bale, Guji, East Hararge, Jimma, East shawa, West Shawa, East Wollega and West Wollega have more than the average distance gravel road in km out of the total zones that covers 50%

from the region. Likewise, the rest 10 zones of the region have less than the average distance of gravel road in km that it accounted by 50%. Generally, three zones like East Hararge, Bale and Arsi zones ranked at the top level or have larger distance gravel road whereas four zones such as Borena, West Gujii,Buno Beddele and Kelam Wollega have held the less amount of the gravel road ranked at the bottom level as compared to the rest zones in the region.

3.4.3. All Weather Road

3.4.3.1. Road Accessibility

Access refers to the opportunity to use or the right to or the ability to reach some destiny. Accessibility is measured as the percentage of population having access to all weather roads. The benefits of having access to a road network is measured in terms of reductions in monetary costs or time needed by beneficiaries to access output markets or key public social services like health and education (Ayele, 2017)

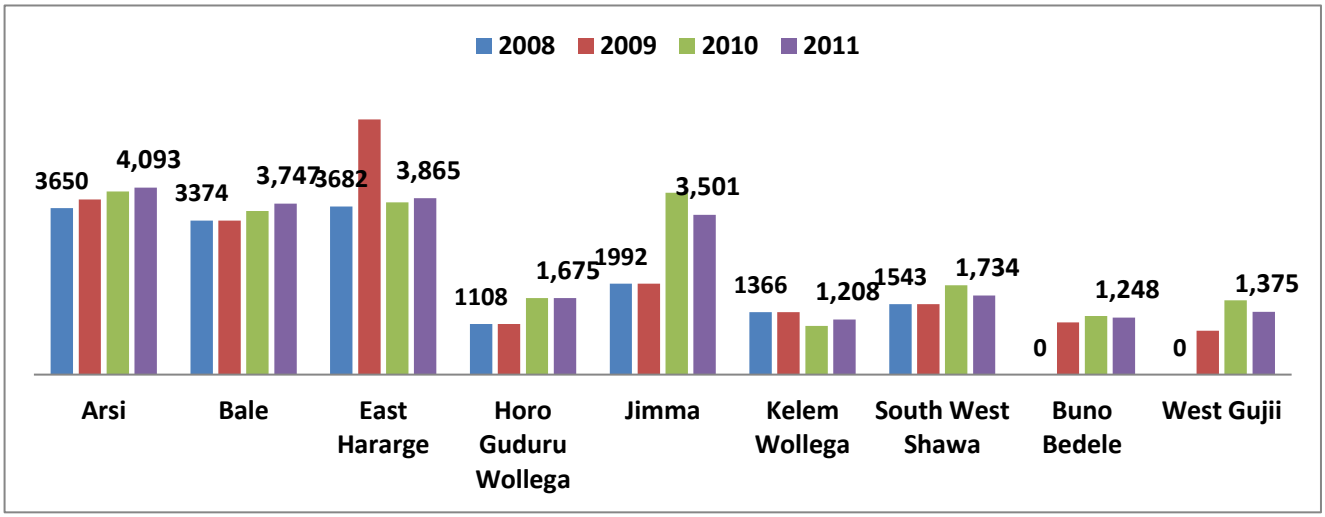
The average of all-weather road distance of the region was 2066 km in 2008. In over-all, 50% regional zones or near 9 zones has less than the average distance of the region all weather road in km out of the 18 zones that located in the region. Such as West Arsi, Borana, West Hararge, Horro Guduru Wollega, Jimma, Kelam Wollega, North Shawa, South West Shawa and East Wollega. Similarly, the same number of zones of the region such asArsi (3650), Bale (3374), Guji (2682), FSOSZ (3428), East Hararge (3682), Ilu Aba Bor (2607), East Shawa (2778), West Shawa (3173), and West Wollega (2268) have more than the average distance all weather road in km out of the total zones that accounted 50% from the region.

The average all-weather road distance of the region was 2349 km in 2009 E.C. Among total zones of the region 8 zones like Arsi (3840), Bale (3354), Borana (3374), Guji (2819), FSOSZ (3428), East Hararge (5591), Ilu Aba Bor (3058), West Shawa (386) and West Wollega (3861) have more than the average distance all-weather road in km that accounted 40% from the regional zones. Whereas the rest 12 zones of the region have less than the average distance of all-weather road. Whereas as the average all weather road distance of the region was 2374 km in 2010 E.C. By and large, nine zones like Arsi 4010, West Arsi (2736), Bale (3583), FSOSZ (3773), East Hararge (3563), Jimma (3986), East Shawa (2993), East Wollega (2483) and West Wollega (274) have more than the average distance all weather road in km out of the total zones that it covered 45% the region's zones. But the rest 11 zones of the region have less than the average distance of all-weather road in km that it accounted 55% from the regional zones in the year.

The average all-weather road distance of the region was 2426 km in 2011 E.C. In the region, 10 zones include Arsi (4093), West Arsi (2720), Bale (3747), Guji (2609), East Hararge (3865), Jimma (3501), East Shawa (3433), West Shawa (2796), East Wollega (2545) and West Wollega (2731) have more than the average distance gravel road in km out of the total zones that covers 50% from the region. Similarly, the rest 10 zones of the region have less than the average distance of all-weather road in km that it accounted 50%. While three zones like East Hararge, Bale and Arsi zones ranked at the top level or have larger distance gravel road whereas four zones of the region such as Borena, Kelam Wollega, Buno Beddele and West Gujii held the gravel road ranked at the bottom level in 2011E.C.

Study has indicated that the average road density for the middle-income countries is 104.7km per 1,000 km2, which is twice higher than that of Ethiopia. The average density in high-income countries is 167.6km per 1,000 sq km, which is about 3.4 times higher than that of Ethiopia. However, the road density in very high income countries (315.8km per 1000 km ^{2}) is about 6 times higher than that of Ethiopia (Dagnew Bogale, 2016).

Figure 3.5. All Weather Roads by Zones in Oromiya Region, 2008-2011 E.C



Source: Computed by the author based on Data of OPED, SA Yearly published

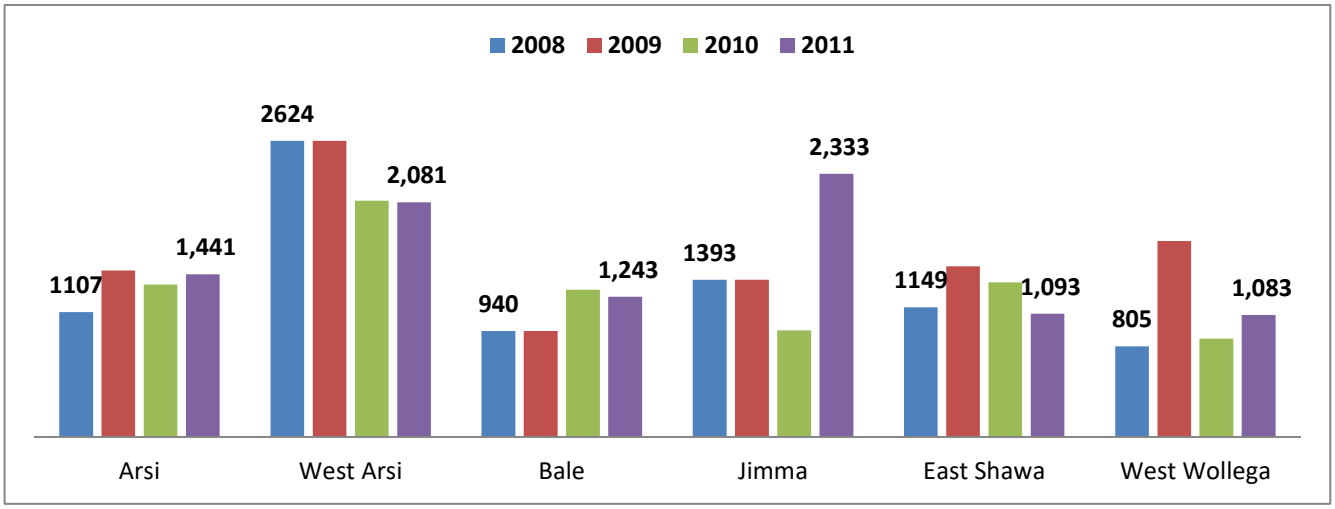
3.4.4. Dry weather Road

The average of all-weather road distance of the region was 2066 km in 2008 E.C. By 2011, 39% of regional zones have greater than the average distance of the region dry weather road out of the 18 zones in the region. Such as, West Arsi, Guji, West Hararge, Ilu Aba Bor, Jimma,Kelam Wollega and West Shawa. The rest zones have less than the average distance dry weather road in km out of the total zones that accounted by 61%. The average dry weather road distance of the region was 1180 km in 2009 E.C. Among 18 zones of the region 12 zones such as Arsi, West Arsi, Borana,Guji,East Hararge,West Hararge, Jimma, East Shawa, West Shawa, East Wollega, West Wollega and West Guji have more than

the average distance dry weather road in km that accounted 60%. Whereas the rest 8 zones of the region have less than the average distance of dry-weather road km in the year in which zones consists of Bale, FSOSZ, Horo Guduru Wollega, Ilu Aba Bor, KelamWollega, North Shawa, South West Shawa and Buno Bedele.

The total amount of 20 zones, the average dry weather road distance of the region was grasped 853 km in 2010 E.C. Among the total 20 zones of the region 7 zones such as Arsi, West Arsi, Bale, Borana, Guji, Ilu Aba Bor, and East Shawa have more than the average distance dry weather road in km that covered by 35%. But the rest 11 zones of the region have less than the average distance of dry-weather road in km that it accounted by 55%. The average dry weather road distance of the region was reached 887 km in 2011 E.C. In the region, 14 zones such as Borana, Guji, FSOSZ, East Hararge, West Hararge, Horo Guduru Wollagga, Ilu Aba Bora, Kelam Wollega, North Shawa, South West Shawa , West Shawa, East Wollega , Buno Bedele and West Guji have less than the average distance gravel road in km out of the total zones that covers 70% from the region. Whereas the rest 6 zones of the region have more than the average distance of dry weather road in km that it accounted by 30%.

Figure 3.6. Dry Weather Road by Zones in Oromiya Region, 2008-2011 E.C.



Source: Computed by the author based on Data of OPDC, SA Yearly published

3.5. Road Density By Zones

Road density: The proper level of road network is assessed by road density, which is measured by road length per 1000 persons or by road length per 1000 km ^{2} (Worku, 2011). Road density is the ratio of the length of the country's total road network to the country's land area. The road network includes all roads in the country: motorways, highways, main or national roads, secondary or regional roads, and other urban and rural roads.

Road Density per Land= $\frac{\text{Length of Road Resource in km*1000}}{\text{Area of land in km}^2}$

Road Density per population= $\frac{\text{Length of Road Resource in km*1000}}{\text{Number of Total Population}}$

By 2011 E.C in Oromiya, the sum of all zones, the total amount of all-weather roads was 48,524 km in the region. Arsi zone has the largest all weather road distance 4093 km whereas the smallest 1208 km of all-weather road coverage was located in Kellam Wollega Zone. In the same year, the regional road density of the all-weather road per population is 1.28 whereas the average road density per population indicated 1.47. Comparing the zones in the region, the lowest level ranked road density per population was located in West Hararge,West Arsi, Jimma and West Shawa zones in which having the value of 0.69,0.94 and 1.02 respectively whereas under the highest level ranked category position were in Borana (3.21), Horo Guduru Wollega (2.1),FSOSZ (1.98), Bale,(1.97) and Ilu Aba Bor zones (1.89) respectively by descending order.

In the other words, the road density per land area in km by zones as compared which consists of West Arsi (213 km), FSOSZ (437 km), East Shawa (360 km) and South West Shawa (298 km) are on the top level ranked the road density per land area respectively from the rest zones. However, zones in which include Guji, Bale, Borana and West Hararge have 32, 59, 81 and 100 respectively under category of lowest level of ranked road density per land area in the region. By 2011, the All-weather Road density per land area of the region was 134 km whereas the average road density per land area indicated 187 km in detail illustrated in table 3.5 annexes.

3.5.1 Impact on Accessibility in Ethiopia

Based on the Road Sector Development Programme 23 years Performance Assessment Report by Ethiopian Roads Authority, the two road indicators selected for this evidence analysis such as the road network and accessibility of the nation indicated below. As far as the Oromiya regional state is big in the nation, the indicators of road access are also big as compared to the rest regional state in the country.

Network Expansion*:* Since its inception in 1997, the RSDP has focused on rehabilitation and expansion of the main paved and unpaved roads and important regional roads. The total road network has expanded from about 26,550 km at the beginning of the RSDP to its current 144,027.8 km including woreda and municipality roads, increasing the road density from 24.1 to 130.9 km per 1000 sq. km and from 0.46 to 1.41 km per 1000 population in 2019/20.

Indicators of Accessibility: Accessibility, measured in terms of average distance from the road network and proportion of area farther than 5 km from an all-weather road, shows that substantial progress has

been made in expanding the road network. Specifically, due to the construction of new roads, the average distance from a road has been reduced from 21km in 1997 to 3.8 km in 2020. The proportion of area farther than 5 km from an all-weather road, which was 79% in 1997, has been reduced to 27% in 2020. And area further than 2 km from all-weather road shows that reduced from 91 km in 1997 to 59.2 km in 2020.

3.6. Urban and Rural Road Density

3.6.1 Urban Road Density

Urban roads density is measured in KMs of Urban roads in the area (State, District) divided by population in thousands in that area (State, District). Urban roads are roads within a limit of a Municipality, Military Cantonment, Port of a Railway Authority. As far as the road density of the region was computed from the all-weather road based on population number and the total land area of the regional state of government so far, similarly possible to figure out the regional road density to classify into rural and urban category taking apart based on the data found out by zonal level that separated into the rural and urban residences independently.

The regional rural road density per population was reached 1.35 up to 2011 E.C and the rural road density of population average was 1.57. The urban road density per population of the region was 0.88 and the average urban roads density per population was 0.73 as urban roads densities per population were computed based on the all-weather road's asset year of the region up to the 2011 E.C. In the other way road density of land in km of the region possible separately computed from the all-weather road based on the land area km^2 of the regional state of government into the rural and urban side. Thus, up to 2011 E.C. the total rural land area is indicated 362,424 km^2 that accounted 99.37 % which has a great lion share and the total urban land area showed 952 km^2 that accounted 0.63 % out of the total 363,376 km^2 land area of the region.

Hence, in the region the land area of the urban is very small as compared to the rural land area; the road density per land area of the urban is very huge and very far from the rural context of road density per land area. However, zones such as Borana 736 km, East Wollega 889 km and Buno Beddele 952 km have the least urban road density per land area from the rest zones in the region. On the other hand, zones like South West Shawa, East Shawa, FSOSZ, HGW and Buno Beddele which have grasped 268, 253, 224, 209 and 208 kms in urban road density per land area respectively that have more than 200km each in the region in the same year as indicated in table 3.8 annexes.

Since level of urbanization in Ethiopia is still less than 20 per cent, urban development fully depends on the level of interactions to its rural economy. Labor, food, information, etc. come from rural areas

whereas inputs for agriculture, high hierarchy services such as higher education and specialized health treatments are provided by urban locations. This is why urban-urban and urban-rural linkages are one of strategy pillars for urban development in Ethiopia. One of the areas Ethiopia looks to realize urban development is to foster urban-urban and urban-rural linkages (Nuriye, 2014).

Development of secondary cities and other small towns supported by planning and mapping is among actions to be taken to foster the link. Development of secondary cities and other small towns is important because such small towns usually emerge from rural market places or other service centers like church, school, flour mill and so on. Their development facilitates the link by the way of playing the role of serving as places to purchase inputs and to sell final products at local markets. This contributes for linking rural producers to the nation and global market in large. Besides higher-level services such as big money transactions, specialized health and education services depend on urban areas. The role of transportation is at the center of such interactions via transport infrastructure (e.g., road access) and services (supply of efficient fleets). Infrastructure connecting urban with other urban and rural areas widens an area of influence. Rural productions are transported, information is exchanged, and people to people communications is enhanced (Nuriye, 2014).

3.6.2 Rural Road Density

Rural roads density is measured in KMs of rural roads in the area (State, District) divided by population in thousands in that area (State, District). Rural roads are roads within a district for which the specifications are lower than for district roads. In Oromiya region, roads had played a great role in both rural and urban areas. Up to the year 2011, the regional all weather rural roads was reached 43,479 km that accounted 90% rural roads that have a lion share from the total 48,524 km of regional all-weather roads as in detail illustrated in table 3.9 annexes.

Consequently, the regional rural road density per population was reached 1.35 in year 2011 as well as the rural road density of population average was 1.57. The regional rural road density per land area indicated 120 km whereas the average rural road density per land area of the region was reached 163 km up to the year 2011. Thus, up to 2011 E.C. the total rural land area is indicated 362,424 km^2 that accounted 99.37 % which has a great lion share out of the total 363,376 km^2 land area of the region. Similarly, when compared between the zones, the smallest rural road density per land area by zones 31, 49, 77 and 94 which have less than 100 km been Borena, Bale, Guji and West Hararge zones respectively from that of the rest zones presented in the region.

3.7. The impact of Rural Road Investment on Poverty Reduction and Economic Development

The systematic review by Hine et al (2016) found that the highest impacts were observed for countries with lowest road densities. For example, in Ethiopia, access to a rural road increased the local growth rate by 9% per year (Dercon et al 2012). Similarly Wondemu (2010) found that between 1989 and 1994, households with access to all weather roads generated 90% greater income(Hine et al., 2019).

In 2000 Ethiopia, only had a road density 0.04 km per sq km, and Tanzania (Fan et al 2005) had a road density at the time of around 0.09 km/sq km. In comparison for the last 100 years India has had by far the highest road density of any large developing country (i.e., currently 1.67 km per sq km). The systematic review by Hine et al (2016) found that the highest impacts were observed for countries with lowest road densities (Hine et al., 2019).

For example, in Ethiopia, access to a rural road increased the local growth rate by 9% per year (Dercon et al 2012), According to Wondimu (2010) found that between 1989 and 1994, households with access to all weather roads generated 90% greater income. In 2000 Ethiopia, only had a road density 0.04 km per sq km, and Tanzania (Fan et al 2005) had a road density at the time of around 0.09 km/sq km. In comparison for the last 100 years India has had by far the highest road density of any large developing country (i.e., currently 1.67 km per sq km) (Hine et al., 2019)

Evidence of the impact of rural road investment on poverty reduction and economic development studies identified are summarized countries such as Bangladesh, Brazil, China, Congo, Ethiopia, India, Indonesia, Nepal and Vietnam. A composite study of Sub Saharan Africa is also included (Hine et al., 2019).

Table 3.6: Methodology and Data Used by the Identified the Impact of Rural Roads (Ethiopia)

Study	*Methodology*	*Study Description*	*Data Sources*	*Duration of Impact Evaluation*
Nakamura *et al.* (2019)1	Difference-in-difference	Quantifies the impacts of constructing a rural road on welfare and economic outcomes among 204 communities	Federal Road Network data from Ethiopian Roads Authority; Ethiopian Rural Socio Economic Survey	2012-2016
Stifel*et al.* (2016)	Willingness to Pay estimation and sensitivity analysis	Investigates the economic benefits of rural feeder roads for 851 households	Questionnaire based survey	2011

Source: Evidence of the Impact of Rural Road Investment on Poverty Reduction & Economic Development p.7

Table 3.7 Impact of Rural Roads (Ethiopia)

Impacts of Rural Road	Study	*Effect of rural roads*
On Income	Nakamura *et al.* (2019)	While average household consumption increased between 2012 and 2016 by 16.1%, the increase was larger amongst remote communities' at., 27.9%.
Poverty Reduction	Nakamura *et al.* (2019)	Results suggested that when connected to rural roads, rural residents were about 10.4 percent less likely to fall into or remain in poverty between 2012 and 2016. Moreover, rural roads households with rural roads exposed to the 2015/16 drought lowered their chance of becoming poor by around 14.4%.
Employment	Nakamura *et al.* (2019)	Access to rural roads increased the share of household members with waged jobs by 2.8%. The impacts were particularly large among women (+2.6%) and the youth (+7.5%) in remote areas.
agricultural output	Nakamura *et al.* (2019)	Rural households were 3.6% more likely to use fertilizer when provided with access to a rural road resulting in an average 32.2% increase in the number of crops sold by rural household. In remote areas, households were 16.1% more likely to sell crops when connected to rural roads.
Transport cost	Stifel*et al.* (2016)	The study showed that a hypothetical rural road project that reduces the transport cost for each household by 50 US$/m ton would benefit household consumption by around 35%, with a range of 15% to 54%.
Economic indicators	Stifel*et al.* (2016)	It was estimated that internal rates of return for hypothetical gravel roads was is the range of 12% to 35%.

Source: Evidence of the Impact of Rural road Investment on Poverty Reduction &Economic Development (Hine et al., 2019)

3.8. Impact of Universal Rural Road Access Program Roads on Ppoverty

According to the Ethiopian Roads Authority (2021) Assessment Report, the Government of Ethiopia designed a five-year programme to link each kebele centre with the nearest all weather roads through construction of 71,532 km in 2010; which further extended to other five years under GTP II; and includes construction of other 90,000 km roads by 2020. Access to all weather road and vital institutions supporting the livelihood of the poor is greatly improving under URRAP.

Most of Kebeles and communities have access to primary schools, extension services, cooperative societies, health extension services within their reach. Institutions such as health centres, hospitals, Woreda major markets; however, need households to spend much of their income. The expansion of URRAP roads and consequently the transition from traditional mode of transportation (on foot and pack animals) to intermediate and modern transportation system has changed the rural livelihood landscape. Traffic flow is increasing on these roads and in many areas; households have easy access to transportation. The construction of these roads is also changing the settlement patterns attracting large number of households across the road. Daily markets, shops, pharmacies and veterinary drug shops, merchandise trade, food and catering services and others are expanding at a rapid rate in most of the roads. Diversification of employment is also rising as many poor households engaged in construction activities and petty trade.

Despite significant stride towards improving access through road infrastructure investments; welfare indicators that can be used for informed decision and policy making are inadequately documented. Accordingly, a baseline survey therefore was designed to monitor the impact evaluation and benchmark indicators on the welfare as the rural road access importance similar explained in the next evidence indicated.

Livability refers to a sub-set of sustainability outcomes that directly affect people's lives, such as access to jobs and economic opportunity, durable housing (resistant to natural disasters), provision of potable water, electricity and ICT, quality schools and reliable health services.

In rural areas, roads can make many of these outcomes possible. At the community level, livability is concerned with environmental and social quality of an area as perceived by residents, employees, customers and visitors. This includes safety and health (traffic safety, personal security, and public health), local environmental conditions (cleanliness, noise, dust, air quality, and water quality), the quality of social interactions (neighborliness, fairness, respect, community identity and pride), opportunities for recreation and entertainment, aesthetics, and existence of unique cultural and environmental resources (e.g., historic structures, mature trees, traditional architectural styles). Through

“green”, “eco-friendly” and “people-friendly” rural roads, not only environmental concerns such as water quality, land conservation, and wildlife protection are addressed, but livability in rural neighbor hoods is enhanced by traffic calming and use of design standards to limit speeds, noise and safety hazards, as demonstrated by Cotton (Faiz et al., 2012).

Increasing access –which can take the form of ownership or the right to use –to these assets can effectively ameliorate poverty. Rural roads facilitate this access and also contribute to capital formation (primarily physical capital, but also human, social and political capital). Equally, rural roads can accelerate the depletion of natural capital (e.g., due to deforestation occasioned by easier access) and may also contribute to diminution of social (e.g., loss of cultural heritage and diversity, decline in social cohesion) and political capital (e.g., from corruption and misuse of public funds). Conversely, rural roads can accelerate the depletion of natural capital (e.g., due to deforestation occasioned by easier access) and may also contribute to diminution of social (e.g., loss of cultural heritage and diversity, decline in social cohesion) and political capital (e.g., from corruption and misuse of public funds).

A sustainable rural roads program will maintain and where possible enhance these stocks or capital assets and also apply safeguards to prevent their degradation or depletion (Faiz et al., 2012).

4. Technical and Vocational Education and Training

4.1 Introduction

Technical and Vocational Education and Training (TVET) is a broadest sense to cover all aspects of training and skills development of cadres, whether formal, non-formal or informal. It is also an education, mainly designed to lead participants to acquire the practical skills and know-how and for employment in a particular occupation and group of occupations. In this concept the word 'technical' is tending to give way to the term 'technological', since this type of education prepares learners for higher education and the term 'vocational education' continues to refer to the acquisition of skills for specific occupations (African Union Commission,2007).

TVET is used as a comprehensive term referring to those aspects the educational process involving, in addition to general education, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various socio-economic sectors. The role of technical and vocational education and training on human resource development and the consequent growth and prosperity of society is an established fact. This is because TVET furnishes skills required to improve productivity, raise income levels and improve access to employment opportunities for people. It does this by playing three major roles: meeting the human power needs of society; raising the employment opportunity of citizens thereby improving their livelihood; and motivating citizens for further education and training. TVET is viewed as an important tool for productivity enhancement poverty reduction in the region (PSIR symposium, 2014).

TVET is geared towards enhancing the competitiveness of all economic sectors through a competent workforce and towards improving people's employability in the labor market and with regard to self-employment. To respond to the changing occupational requirements and to accommodate the different demand of the various target groups, the TVET system will allow and encourage flexibility and dynamic development of the TVET offers. This applies to the organization and delivery of TVET programs as well as to the way in which people can pursue their individual occupational careers. The TVET institutions are organized to different levels: institutions, colleges and polytechnics to give different levels of training. TVET institutions train from Level 1 to Level 3; TVET colleges from Level 1 to Level 4; and Polytechnics from Level 1 to Level 5(Competence-Based TVET,2016).

4.1 Concept of Technical and Vocation Education and Training

Countries around the world define the Technical and Vocational Education and Training sector in various ways, but in terms of content, all have a common understanding that it is aimed at granting professional skill, reducing poverty and unemployment, and contributing to the resolving the socioeconomic crisis of

a country. Participant countries of the International second Congress on Technical Vocational Education and Training which took place in South Korea in 1999 harmonized and settled that it is appropriate to name activities that grant education and skills which required conducting professional work in industrial and service sectors workplaces Technical and Vocational Education and Training as a whole.

UNESCO -UNEVOC defined as following; 'technical and vocational education and training' are understood as comprising education, training and skills development relating to a wide range of occupational fields, production, services and livelihoods. TVET, as part of lifelong learning, can take place at secondary, post-secondary and tertiary levels and includes work-based education and continuing training and professional development which may lead to qualifications. TVET also consists of a wide range of skills development opportunities agreed to national and local contexts. Learning to learn, the development of literacy and numeracy skills, transversal skills and citizenship skills are integral components of TVET. TVET is an education process involving to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic. It includes the development of skills and competencies relevant to the world of work in a range of learning contexts including private and public training institutions, work places and informal learning places.

The principal objective of TVET is to train youths and adults alike, readying them for the labor market. With technical revolution and innovations in science and technology, labor market needs have significantly evolved. New challenges must be met in order to match the education proposed with vocational demands. In that regard, several countries are in the process of reforming their education system, with a view to training youths to meet national, regional or international market needs. Skills development at TVET is an important component of the massive Ethiopia education system and has had a profound impact on enhancing national employment and competitiveness.

4.2 The Policy Framework

Technical and Vocational Education and Training provides trainees with the technical skills applicable for the particular trade. In practice, different types of programmes are included under the umbrella of TVET. Grubb and Ryan (1999) distinguish the following four types of programmes. (1) Pre-employment Vocational Education and Training – prepares individuals for the initial entry into the employment. The regular track of the TVET in Ethiopia falls under this category. (2) Upgrade training provides additional training for the employed individuals; (3) Retraining provides the training for individuals that have lost jobs or for those wishing to switch careers; (4) Remedial TVET provides training to individuals out of the mainstream labor force.

In 2007, the African Union drafted the Strategy to Revitalize Technical and Vocational Education and Training in Africa (African Union, 2007). The report states that there is a fresh awareness among many African countries of the critical role that TVET plays in the national development. The objectives of the strategy are to revitalize and modernize TVET in Africa and to transform it into mainstream activity for African Youth.

Government policies and actions are the economic and political environment which includes various factors that would be affected the self-employed. Among the economic factors such as lack of capital, working place, facilities and the market are at the forefront. The issue of start-up capital and inadequate provision of micro-credit services are therefore central to the technical and vocational education and training graduates to start new Micro and Small Enterprise.

The Education and Training Policy (1994) is a big milestone in recognizing TVET as one of Ethiopian human resource development sectors and track by itself which is parallel to academic. The policy served as basis to create better access for TVET for majority of the citizens. The policy advocates skill training relevant to local economic development to be given at primary school levels and school dropouts. The policy does also encourage about 70 - 80 % General Education (first cycle secondary education and secondary cycle secondary education) leavers to go through TVET so that they would be productive workforce. The policy has put basic guideline for skill training (TVET) to be inclusive for urban and rural community, academically successful and dropouts in their general education, gender parity, and for people with special needs so that better equitable access to TVET would be achieved.

The TVET system consists of a two-pronged approach of offering formal and non-formal technical and vocational training programmes. The formal TVET system caters to students who complete at least grade 10 of their education, and proceed to attend one to five years of TVET training courses. Depending on their completed levels in TVET colleges, students then obtain a certificate, diploma or advanced diploma 4. The first formal TVET strategy was introduced in 2002–2005, and focused on infrastructure development and increasing enrolment. In subsequent reforms (formulated within PASDEP and GTPI) the government attempted to strengthen the employability of graduates and the quality of the training programmes.

4.3 Technical and Vocation Education and Training Strategy

The TVET strategy reflects an important paradigm shift of recent years which places quality and relevance of TVET as its priority. It is aimed at responding to the competence needs of the labor market and to create a competent, motivated and adaptable workforce capable of driving economic growth and development. The Plan for Accelerated and Sustained Development to End Poverty (PASDEP), the

Industrial Development Strategy and other sector development strategies, the Ethiopian Government has initiated a new push towards creating frameworks conducive to economic and social development. Comprehensive capacity building and human capital formation are key pillars in all these efforts. As such, this new National TVET Strategy is an important element of the overall policy framework towards development and poverty reduction

The TVET Strategy in Ethiopia has been managed by a combination of government funding, intensive short-term teacher training and building of TVET centers. However, the rationale was still that of a supply-driven system. Hence, the future stages of the TVET reform require a paradigm shift towards a demand and outcome driven system. This holds not only for the training itself, but for the management of the TVET system and its institutions as well. The deciding factor for success is not input or supply, but performance (GTZ, 2006).

Ensuring that Ethiopia advances from a largely agrarian to an industry-based economy requires the development of middle level workers to satisfy the labor demand of the different sectors of the economy. As an increasing number of young people graduate from general education, the government of Ethiopia has recognized that it is of greatest importance to provide them with options for further education and training in order to increase their employability. In this context, it is important to build a demand driven, flexible, integrated and high quality TVET system. The Government of Ethiopia has involved all stakeholders in the planning, policy making, training delivery and monitoring and evaluation of the TVET system. Therefore, the ongoing reform seeks to increase the engagement of the private sector both of; private TVET providers and enterprises as future employers of TVET graduates and to provide students and trainees with knowledge, skills and abilities relevant for the world of work.

4.4 Objectives National Technical and Vocation Education and Training Strategy

The overall objective of the National TVET Strategy is to create a competent, motivated, adaptable and innovative workforce in Ethiopia contributing to poverty reduction and social and economic development through facilitating demand-driven, high quality technical and vocational education and training, relevant to all sectors of the economy, at all levels and to all people.

Specifically, the National TVET Strategy aims to:

- Create and further develop a comprehensive, integrated, outcome-based and decentralized TVET system for Ethiopia
- Strengthen TVET institutions in view of making them centers for Technology capability, accumulation and transfer

- Create a coherent framework for all actors and stakeholders in the TVET system
- Establish and capacitate the necessary institutional set-up to manage and implement TVET in ensuring quality management system (QMS)
- Improve the quality of TVET (formal and non-formal) at all levels and make it responsive to the needs of the labor market
- Facilitate the expansion of relevant TVET offers which are crucial to national development
- Strengthen the private training provision and encourage enterprises to participate in the TVET system
- Empower women and rural people through skills development
- Ensure equal access of women and people with special needs to TVET
- Strengthen the culture of self-employment and support job creation in the economy, in particular in the emerging regions
- Develop a sustainable financing system for TVET with efficient and cost-effective delivery systems and management structures
- Build the necessary human capacities to effectively manage and implement TVET

4.5 Technical and Vocation Education and Training System in Ethiopia

The Ethiopia education system involves eight years of primary education and two years of general education (grades 9 and 10). After completing grade 10, students are streamed either to college preparatory schools or to technical and vocational education and training, based on their achievement in the grade 10 national examination. Those students who successfully pass the national examination join a preparatory program (grades 11-12), a program which prepares students for university education. Those who complete grade 10 but are unable to join the preparatory programs because of a low Ethiopia General Secondary Education Certificate Examination score are placed in middle-level training at different TVET levels.

Students can enroll in a TVET programme level 1-4 after grade 10 and grade 12, and their level is determined by their exam results. Those who start at level 1 can climb the ladder to higher levels, with the passing of the occupational assessment. Level 5 can be accessed after completion of level 4, or with a first degree from university. Graduates from level 5 TVET should be able to transition to first degree university courses as well, but, in practice, this transition is difficult. The Ministry of Science and Higher Education is proposing to make the transition from TVET to University education easier. Recently, TVET in Oromiya has offers training at five levels. Level- I and II trainings are basic skills trainings in which individuals who are not able to complete general education (grade 10) join the training programs. Levels -III, IV and V, which together are also called middle-level training, are TVET qualifications just below a bachelor's degree in which students who have completed general education enroll.

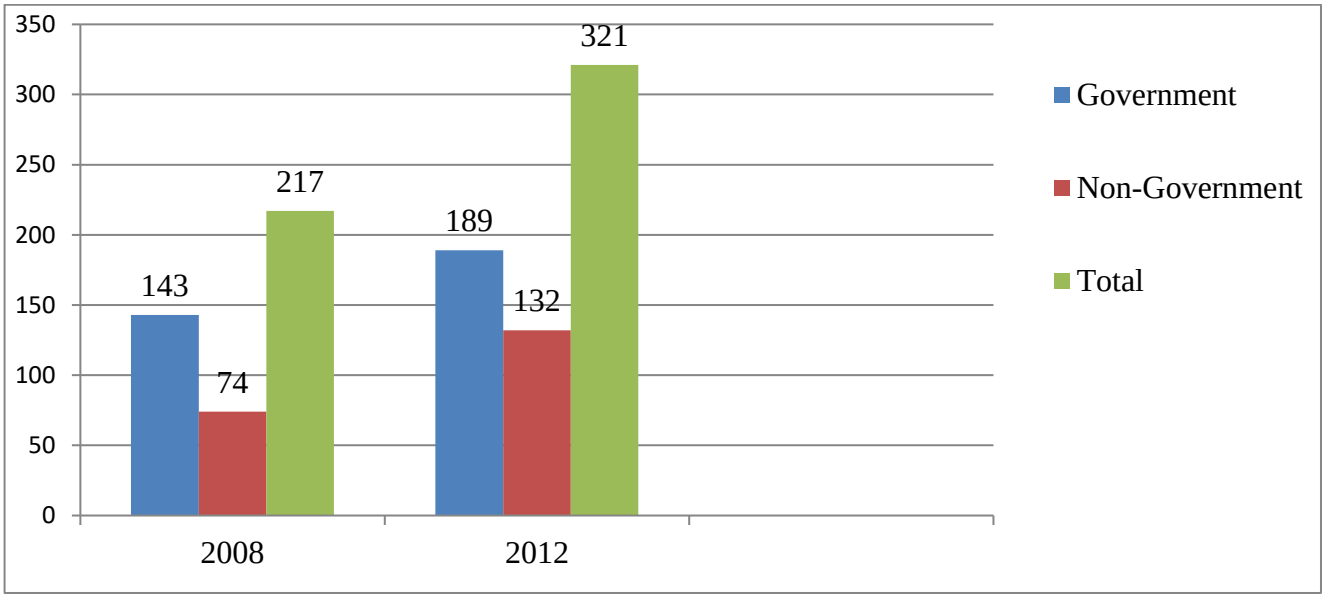
The level-based training is structured so that one level is terminal and at the same time a step to the next level. Middle-level TVET was chosen for this study because students at this level have more school experience than level I and II students and because middle-level TVET students stay longer in the training programs. Level I and II training programs are also part of the middle-level training. As students of level III, IV and V programs also pass-through level I and II programs they are able to provide information on the conditions of implementation in all levels of training. TVET students in middle-level TVET are relatively more mature in terms of experience and their understanding of TVET programs and the research instruments than students in levels I and II. TVET is offered at four types of TVET centers: TVET Institutions (provide only level I and II training), TVET Colleges (provide only level I-III training) and Polytechnic TVET colleges (provide training in all levels (I-V).

4.6 Technical and Vocation Education and Training Colleges

A TVET education can provide all the necessary skills and knowledge for careers. It focuses on vocational and occupational education and training with aim of preparing students to become functional workers in a skilled trade. Students that can go to TVET – those who could not get sufficiently high scores to go to university during the national exam at the end of grade 12.

According to figure 4.1 shows that the number of TVET colleges (both government and non-government) has increased from 217 in 2008 to 321 in 2012 with a growth rate of 47.9% between 2008 and 2012E.C. The non-government TVET colleges in Oromia region increased from 74 in 2008 to 132 in 2010. Nearly, from a total of 321 TVET colleges, about 58.9% and 41.1% were owned by the government and non-government respectively in a 2012 year.

Figure 4. Number of TVET colleges, 2008 and 2012E.C



Source; OPDC Evaluation of the Second Gross and Transformation Plan, 2012

4.7 Enrolment in Technical and Vocation Education and Training

Table4.1 below shows that there has been steady increase in the number of students enrolled in TVET training institutions by sex from 2008 - 2012. An enrolment comprises the number of students those enrolled in both government and non-government TVET colleges. The total enrollments in TVET have risen from 114,671 to 177,652 between 2008 and 2012 which amount to increase about 54.9%, over the last five years. This is followed by an increase in enrollment of 2.4% in 2008 to 2009, 21.1% in 2009 to 2010, 19.3% in 2010 to 2011 and 4.7% between 2011 and 2012.

The enrolment of male in TVET has reached 92,878 from 59,430, with a growth rate of 56.3% between 2008 and 2012. In the last five years, female enrollment has also significantly increased in the TVET colleges. The enrolment of female students has risen from 55,241 to 84,774, with a growth rate of 53.5% over the 2008-12 periods. The growth rate of both male and female enrolments increased from 2.0% and 3.0 in 2009 to 3.5% and 6.2% in 2012 respectively over the last five years. There were disparities in numbers according to gender with male dominating over the year in the past five years.

Table 4.1 Enrolments in TVET by Sex,2008-2011E.C

Year	2008	2009	2010	2011	2012
Male	59,430	60,600	74,011	89,766	92,878
Female	55,241	56,874	68,196	79,846	84,774
Total	114,671	117,474	142,207	169,612	177,652

Source: OPDC Statistical Abstract and Oromiya TVET Bureau 2008-2012

4.8 Technical and Vocation Education and Training Enrolments by Level

The youngsters from ages17 -19 can start Technical and Vocational Education and Training from any level that they want among different occupations which are categorized into different sectors and level with the exceptions of level five (polytechnics level) that necessarily requires prior to TVET background. Therefore, youngsters can join level one, two, three and four depending on their grade ten and twelve examination result. The Ministry of Education and Oromiya TVET Bureau determine the cut-off grade that guides TVET colleges' enrollment of new entrants. Those who start Level-I also can through time can join level-IV and level-V but need to necessarily pass occupation assessment undertaken at end of each level. Therefore, through the TVET system one can start from level-I and join higher education through level-IV and level-V.

Table 4.2 below shows, the enrollment in level- I and Level -II has increased from 68803 in 2008 to 69844 in 2012 with a growth rate of 1.5% over the last five years in the region. The enrollments at level-I and level- II increased from 14.6% in 2009 to 2010 and from 14.1 % in 2010 to 2011 and would drop 25.8% between 2011 to 2012.The number of enrollments at level -III and Level- IV has also shown a gradually increased from 45,868 in 2008 to 92,876 in 2012 with 102.5% growth rate over the past five years. The enrollment at level-III and level- IV increased from 31.3% in 2009 -2010, 26.4% in 2010 -2011and 23.1 % between 2011 and 2012 in the region.

Table4.2. Number of Students Enrollment in TVET by Level,2008-2012 E.C

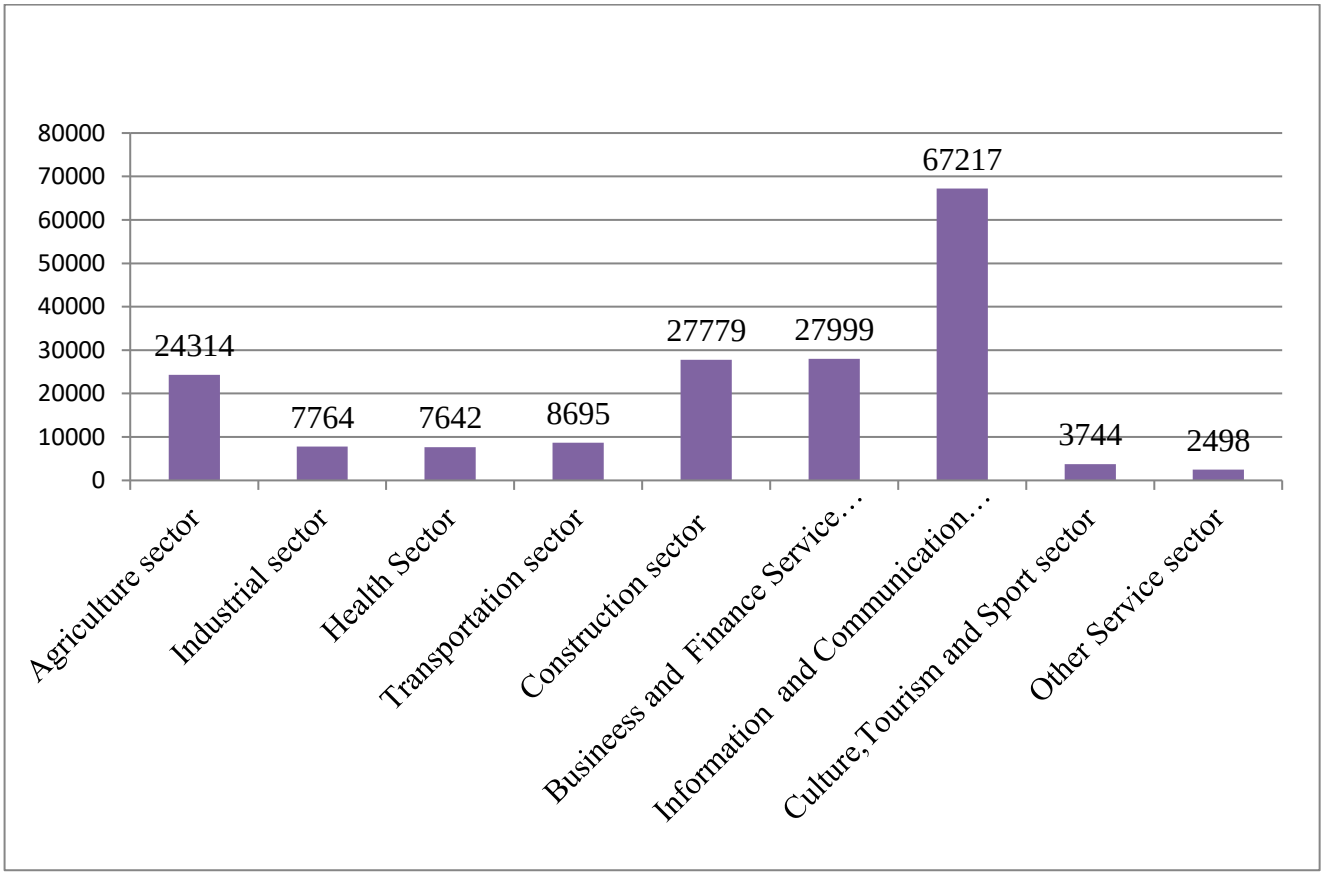
Year	Level I and II			Level III and IV		
	Male	Female	Total	Male	Female	Total
2008	35658	33145	68803	23772	22096	45868
2009	36288	35744	72032	24312	21130	45442
2010	42634	39921	82555	31377	28275	59652
2011	49476	44710	94186	40290	35136	75426
2012	35650	34194	69844	51241	41635	92876

Source; OPDC Statistical Abstract and Oromiya TVET Bureau 2008-2012

4.9 Enrollment by Technical and Vocation Education and Training Sector

Figure 4.1 below shows, around 17,7652 students studied during the academic year of 2012 in different fields or economic sectors. The figure4.1 shows that information and communication technology, business and finance service, construction, and agriculture sectors prepared high numbers of students to study these fields. There are 67,217 students' study in the information and communication technology sector, 27,999 business and finance service, 27,779 students in the construction sector and 24,314 students in the agriculture sector. The figure also shows that 37.8percent of total students participate in information and communication technology, 15.8 percent in business and finance service, 11.8 percent 15.8 percent in construction and 13.8 percent agriculture in professional training to get competency certificate. The total students are study in these fields is higher comparing to the other sectors. This shows that adults are more interested in studying in the information and communication technology sector. The number of student's study in the other service sector like security, energy, municipality services and greening infrastructure sector during the academic year of 2012 was the lowest i.e., 1.4% out of total students.

Figure4:1 Number of students study in TVET by Economic Sectors, 2012E.C

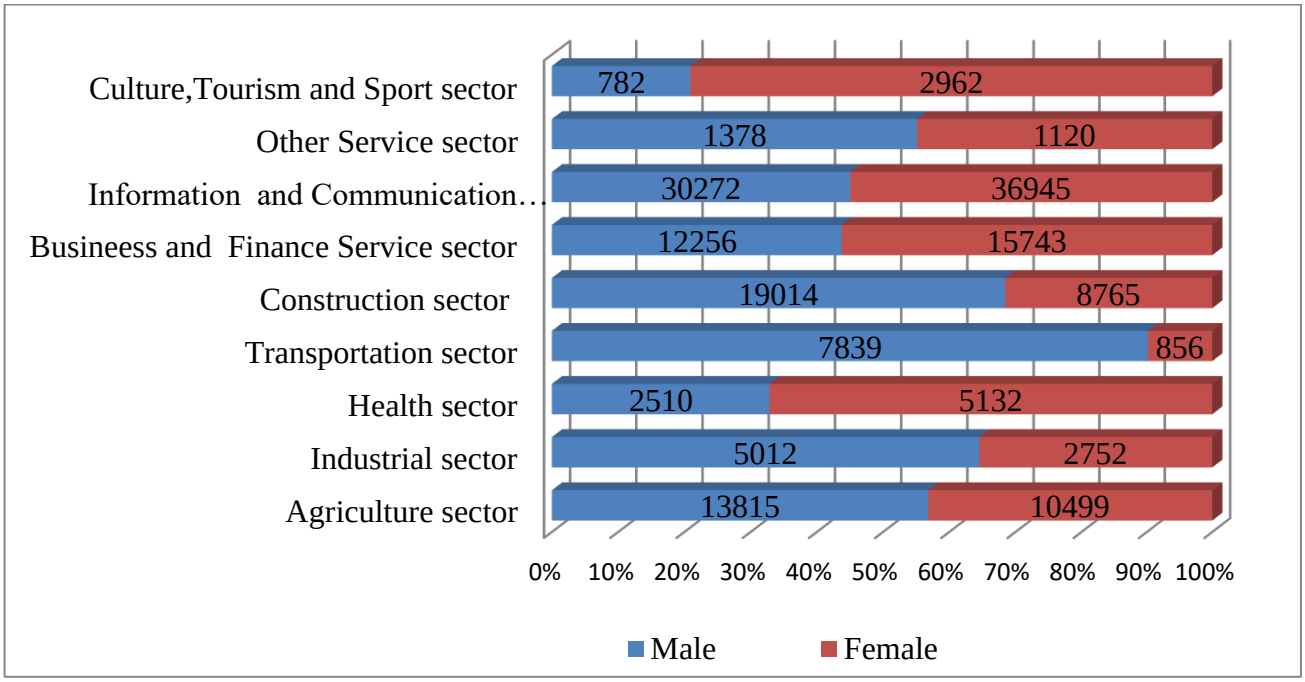


Source; Oromiya TVET Bureau, 2012

4.10 The Participation Rate of Female Students in Technical and Vocation Education and Training

Figure 4.2 shows that the number of female students during the academic year of 2012 within in the total numbers of students. There are 92,878 male and 84,774 female students' study in TVET, of which 47.7% were female and majority study in the information and communication technology, business and finance service, agriculture and construction sector. During the academic year of 2012, the majority of them majored in information and communication technology (20.8%), business and finance service (8.9%), and agriculture (5.9%) and construction (4.9%) sectors respectively during 2012 year. The figure shows that culture, tourism and sport have the highest gender gap between male and female, with 0.4% for male and 1.7% for female. It is important to note that TVET colleges are increasing female participation in the economic sectors.

Figure 4.2 Number of Female students in the Total Students, 2012E.C

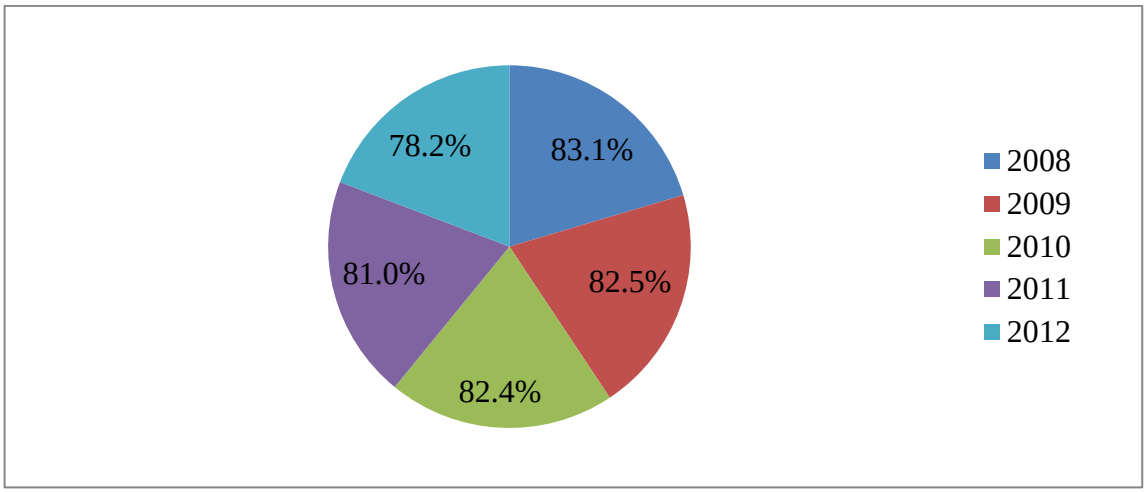


Source: Oromiya TVET Bureau, 2012

4.11 Technical and Vocation Education and Training Graduate students

Figure4.3 shows a total annual rate of TVET graduates from 2008 to 2012. As it can be seen from figure4.3 the annual rate of TVET graduates decreased from 83.3% in 2008 to 78.2% in 2012. The figure shows that the proportion of students graduating from TVET programs has decreased by 1.5% on average in the last 5 years. This implies that a graduation rate from TVET has been steadily falling over the past five years. It would fall from 83.1% to graduates in academic 2008 to 78.2% in academic year 2012.This may be dropout rate among TVET students.

Figure 4.3 Total Annual Rates of TVET Graduates,2008-2012E.C



Source: OPDC Statistical Abstract, 2008-2012

4.12 Skill Competency in Technical and Vocation Education and Training

To understand the status of training provision in the TVET institutions by assessing the competence of trainers who were sat and passed in certification of competence (COC). As MoE (2008) states the output quality of TVET delivery will be measured through a process of learner's achieved competence. This is done through occupational assessment, which is based on the occupational standards. Occupational assessment, and hence certification, is open to everybody who has developed the required competence through any means of formal and non-formal TVET or informal learning.

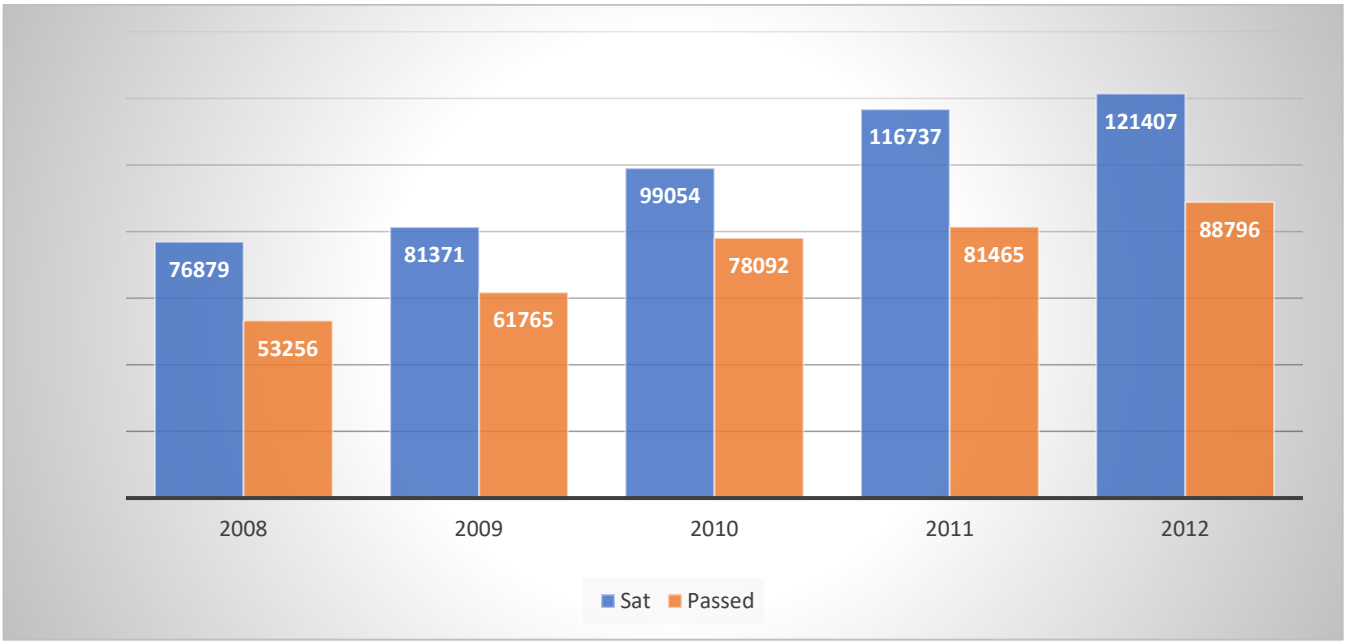
Competence-Based Assessment System strategy envisages that assessment will be conducted externally in all occupational qualifications at all levels of the Ethiopian national qualifications framework for TVET in accredited assessment centers by accredited assessors. Followed by a certification upon passing the assessment. Towards this end, the Federal Technical and Vocational Education and Training Agency is expected to: (a) establish a national system for occupational assessment and certification; (b) specify assessment-related rules and procedures; and, (c) monitor and evaluate the system. Regional TVET authorities (agencies) are responsible for ensuring proper implementation of the assessment and certification system and for the establishment of centers of competence in regional states.

Concerning assessment, the tenth competence-based assessment principle requires students/trainees be regularly assessed. As mentioned earlier, the national TVET strategy demands the conduct of competence-based assessment and certification. Specifically, the occupational assessment and certification directive requires that the competence requirement of the world of work (i.e., the Occupational Standard) should be

at the center of not only training but also assessment and certification. Evidence also indicates that the TVET system promotes vocational practice (rather than theory-focused tests) as main method of assessment. It is further stated that assessment for levels I and II will be only practice-based while assessment for levels III to V will enrich practical tasks with knowledge-based exercise. In the directive, certification is defined as "a formal process of recognizing that an individual is qualified in terms of the required knowledge, skills and proper work attitudes based on the occupational standards set by industry". This indicates that competence is the main criteria for certification.

Figure4.4 below shows, a total number of TVET students who were sat and passed for COC exam between 2008 and 2012.The number of TVET trainees who sat for COC exam has increased from 76,879 in 2008 to 121,407 in 2012, equivalent to a growth rate of 11.4 percent. As it is seen from the figure4.4, the TVET students who were sat for COC exam has increased between 2008-12 periods. The average percentage of students who sat for COC exam was 5.8% in 2009 and 21.7% in 2010. But as of 2011 the percentage started to decline (3.4% in 2011 and 4.0% in 2012).

Figure 4.4 Numbers of Students Who Took COC Exam,2008-2012E.C



Source: OPDC Statistical Abstract 2008-2012

As can be seen from figure 4.4 the number of TVET trainees who passed COC exam increased from 53,256 to 88,796 between 2008 and 2012, equivalent to annual average growth rate of 12.9 percent. The average percentage of students who passed COC exam would raise from 16.0% in 2009 to 24.4% in 2010, marking the highest percent, it dropped to 4.3% in 2011 but reached 9.0% in 2012. A total

number of TVET students who sat and passed for COC exam would fall from 5.8% to 4.0% and from 16.0% to 9.0% respectively over the 2008-12 periods.

4.13 Technical and Vocation Education and Training Teacher

An Organization for Economic Co-operation and Development refers to vocational trainers as those who are primarily responsible for imparting practical vocational skills, whereas vocational teachers are those primarily responsible for theoretical skill instruction. Different countries would be encouraging a combination of the theoretical and practical, or the general (languages, maths, sciences, etc.) and technical/vocational subjects to be taught by the same individual, for the purpose of this report teachers and trainers are understood to apply equally to staff in a TVET system or institution who are responsible for instruction of learners, whatever the subject or instructional orientation. The term 'teacher and trainer 'encompasses the term such as 'tutor', 'lecture' or 'instructor 'used in various national contexts.

The competent, qualified, motivated, flexible and creative TVET teachers and instructors are backbone of any TVET system, capable of adjusting to changing technological environments and creating conducive learning environments for different target groups. To this end, the Government of Ethiopia is in the process of fundamentally renovating the system and provision of TVET teacher trainings. The aim of this process is to create a corps of TVET teachers capable of preparing trainees to successfully pass an occupational assessment. Systematic training, education and further training will be provided for teachers and instructors in the TVET system at all levels in the formal programmes.

As the table 4.3 below indicates, the total number of TVET teacher has rapidly increased from 3639 in 2008 to 6814 in 2012, equivalent to an annual growth rate of 21 percent over the last five years. In 2008 there were 2933 male teachers and 709 female teachers teaching in TVET colleges. This number has increased to 5581 male and 1233 female teachers by 2012. The share of female teachers was decreased from 19% percent in 2008 to 18% in 2012, indicating that female teachers are less in TVET colleges. The data show that in TVET colleges, the number of male teachers exceeds the number of female teachers over the year.

Table 4.3 Number of TVET Teacher by Sex,2008-2012E.C

Year	2008	2009	2010	2011	2012
Male	2933	3133	3145	3780	5581
Female	709	981	1381	953	1233
Total	3639	4114	4526	4733	6814

Source: OPDC Statistical Abstract, 2008-2012

4.14 Qualifying Technical and Vocation Education and Training Teachers

Depending on the five levels of training (I-V) identified for TVET education, trainers are expected to be qualified at three levels: levels A, B, and C, with a signaling that a trainer has the most advanced level of qualifications. Level C trainers are expected to teach at Level I, II and III. They should be graduates of a TVET institute, having attended their education above Level III. Level IV students are expected to be taught at least by B-level trainers who must have a bachelor's degree, are assessed as competent to train at the level and have taken a B-level training methodology course.

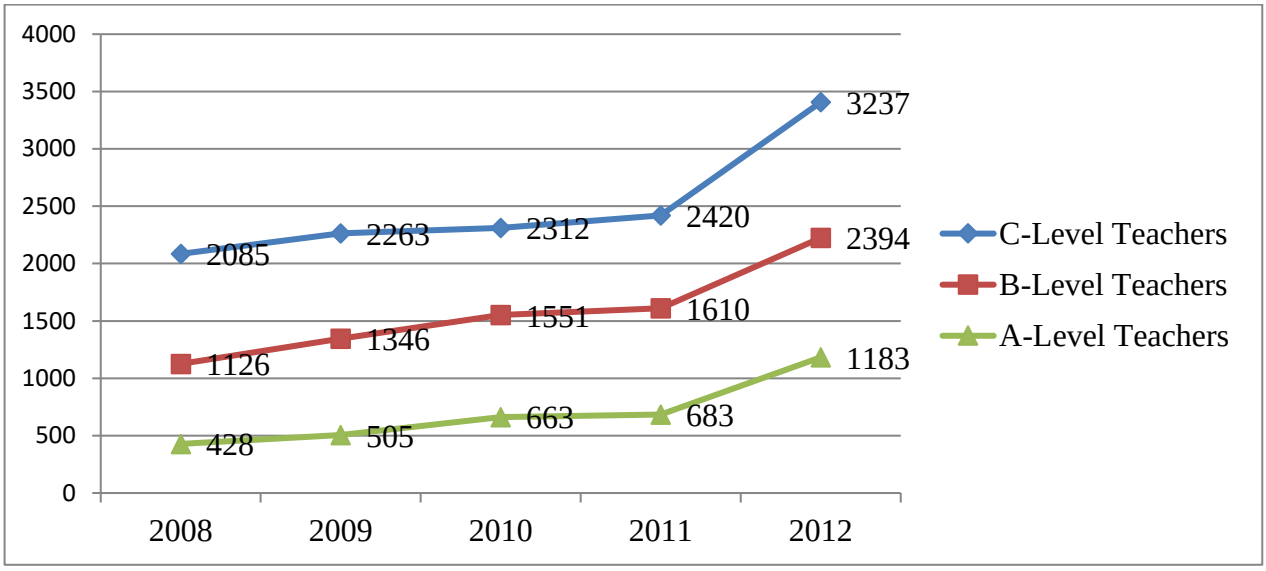
After having been qualified as a Level-C instructor, an individual can upgrade himself or herself to a B-level trainer by enrolling for three- to four-year courses at teacher training institutes. Level V students are supposed to be taught by A-level trainers who are expected to have a master 's degree, must have been assessed as competent to train at the level, and have completed A-level teaching methodology training. Since the highest instructor level within TVET institutions is Level A, these instructors can teach at any of the lower levels as well.

According to figure 4.5 shows, a total number of TVET teachers increased from 13.1% to 44.6% between 2008 and 2012. Data on figure 4.5 indicates that the number of Level-C teachers increased from 2,085 in 2008 to 3,237 in 2012; expected to grow on average by 10 percent over the last five years. On average, the number of C-level teacher has decreased from 8.5% in 2009 to 2.3% in 2010, rose to 4.7% in 2011 but reached 37.8% in 2012, marking the highest percent.

The B-level teachers also increased from 1126 to 2394 within an annual average growth of rate of 18.9% during the 2008-2012years.The B-level trainers declined from 19.5% in 2009 to 3.8% in 2011 but reached 48.7% in 2012.Simirally, A-level teachers increased from 428 to 1183 within an annual average growth of rate of 20.3% between 2008 and 2012. The A-level trainers dropped from 18.0% in 2009 to 3.0% in 2011 but reached 42.3 % in 2012.

As the figure 4.5 shows that, some of TVET teachers hired as C-level teachers in the TVET institutions. In 2012, the distribution of TVET teachers of 1:2:3 ratios for A: B: C level teachers. According to the Planning and Economic Development commission of Oromiya statistical abstract data, 2% of total teachers is PhD degree teachers, 16% covers master degree teachers, 35% of total teachers is bachelor degree teachers and diploma teachers cover 48%. It is need to continuously upgrade the education degree and professional degree of teachers. The proportion of PhD and master degree is relatively low, with less than half of the total number of teachers, indicating that there is a need to intensify PhD and master degree teacher and improve education.

Figure 4.5 Number of TVET Trainers by Level, 2008-2012E.C



Source: OPDC Statistical Abstract from 2008-2012

4.15 Technology Promoted to Micro Small-Scale Enterprises

The TVET education curriculum with the world work of MSE is an essential. Thus, the integration of MSE development strategy with TVET development strategy is a fundamental issue for poverty reduction and growth strategy of the countries. It works to transfer technologies through creating, copying, accumulating and expanding different machineries to MSE sectors (MSE, 2011).

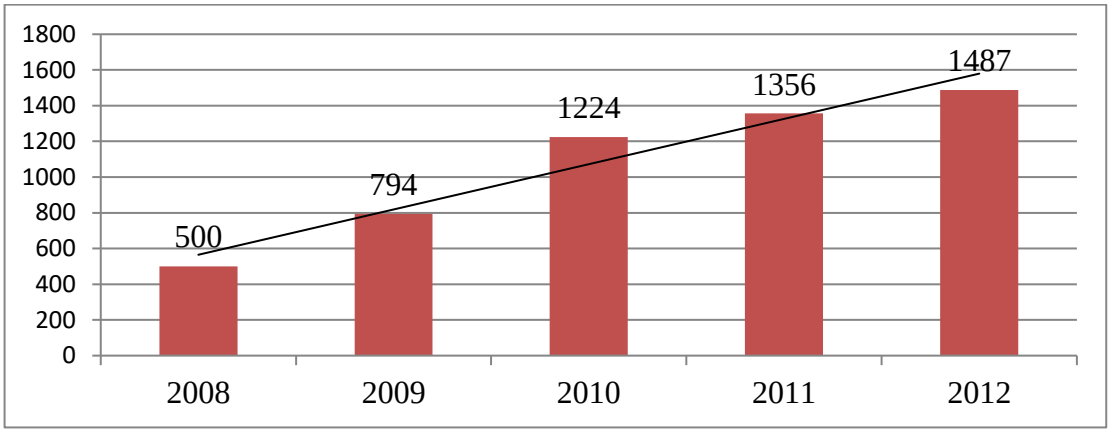
One of the important features of TVET is its ample field for the hub of technology for MSE and the emphasis of the curriculum on the acquisition of employable skills and applicable technologies. To realize this technology development, the TVET institution will take the task of industry extension service in ownership right based on the direction of industry development strategy.

Technology transfer is a key factor strongly impacting on economic growth both in the short and long term. The access to technology and its usage in economic processes to large extent decides as to the competitive position in the international labor division. Technology transfer can be defined as a flow between technology owner/holder and technology buyer/user. It enables closing the gap in access to particular technology in different ways: buying, renting, lending or licensing. An important element strictly related to technology transfer is the technology commercialization – which is a technology transfer with a special emphasis on practical.

According to figure 4.6 shows, TVET has an important role to play in technology diffusion through transfer of knowledge and skills. The number of technologies created and transferred to Micro Small-Scale Enterprises increased from 500 to 1487 between 2008 and 2012. The TVET technology promoted to MSSE has decreased from 58.8% in 2009 to 9.6% in 2012. Technology is the main factors that

influence the success or failure of a MSSE. There is need to technology created and transferred to MSSE on issues of quality; productivity and market access facilitate generation and distribution of wealth and job creation in the region for the benefit of all

Figure 4.6. Number of Technology Created and Transferred to MSSE,2008-2012E.C



Source; OPDC Statistical Abstract from 2008-2012

5. Conclusions

Agriculture, characterized mainly by smallholder farmers is the dominant economic activity of the country. However, the agricultural sector in Oromia region is the principal engine of growth of the economy accounting for 83% of the labor force, 90% of exports and 45% of gross domestic product (GDP). Oromiya region in Ethiopia is plays a central role in the national crop production, total pulses, oilseeds, root crops and total fruit crop production. The backbone of any agricultural revolution is access of farmers to modern agricultural inputs. These agricultural inputs range from improved seeds, fertilizers and crop protection chemicals to machinery, irrigation and knowledge.

Road transport facilities play a role in both the production and consumption decisions of every household in their day-to-day activities. Besides, road transport facilities are essential for expanding education, health service provision, trade facilitation – both within the country and the export market, and better public as well as private service provisions, including banking and insurance services, to the destitute and marginalized rural dweller. Conversely, lack of accessibility or poor road conditions are barriers to agriculture, industry and trade, and may hinder the entire development effort.

The Oromiya region, on average the network has been growing at a rate of 22 percent per annum over the period 2004-2011 E.C. By 2011, the regional all weather rural roads were reached 43,479 km which accounted 90% which has a lion share. The regional rural road density per population was reached 1.35 up to 2011 E.C and the rural road density of population average was 1.57. The urban road density per

population of the region was 0.88 and the average urban roads density per population was 0.73 as urban roads densities per population were computed based on the all-weather road's asset in the region up to the 2011 E.C. The rise in the length of road in the region is due to the emphasis given to the sector.

The provision of safe and sufficient water supply and adequate sanitation services are indispensable components in the sustainable development of Oromiya urban and rural socioeconomic well-being. Groundwater is usually consumed without any form of treatment. Oromiya region such as dam, river diversion, shallow wells, deep wells, spring on spot, hand dug wells and motorized spring are the main sources of drinking water. Among all water sources; spring on spot is the most widely used, accounting for about 56.9% of all potable water sources.

The functionality rate of water schemes in Oromiya region was been raised from 87% in 2003 to 88%. in 2011. Functional water schemes were increased from 2003 to 2004 by 21%, from 2004 to 2005 by 39%, from 2005 to 2006 by 34% and from 2009 to 2010 by 1.6%. In access to improved drinking water coverage of Oromiya zones range from lowest Bale (40%) to the highest East Wollega (79%) zone in 2011 E.C.

Ethiopia plan to reach the SDGs of ending of unsafe drinking water by 2030, achieving 100% coverage of potable water. On the other hand, Oromiya region plan to reach an average of 94.6 percent at the end of 2030 (OPEC, 2020). Oromiya requires a 3.16 percent average annual rate of change to achieve the SDGs 2030 target of 94.6 percent coverage. But the current annual rate of change is below one percent which is far below the expected annual rate of change. So, Oromiya is off-track to reach the SDGs of ending of unsafe drinking water by 2030. Therefore, responsible bodies should have rapidly scale up and promote investment on water supply infrastructure and also identify the major constraints of water supply in Oromiya region such as inadequate finance, inadequate manpower, weak coordination among the offices, failure to implementing the policies effectively as it was written on the paper, lack of other institutions that involve in the provision of water service, rapid population growth, failure to mobilize the community.

On the other hand, TVET as the major producer of skilled workforce play important roles in addressing sustainable development. TVET players must play at different levels such as creating awareness, be the agent that promoting technology, creating workforce that support people livelihood. It is an effective means to raise incomes both formal and informal. TVET is an efficient way to up skill and increase productivity for agriculture and industry.

The number of TVET College has steadily increased over the past five years and is estimated to have reached at least 321 in 2012 with a growth rate of 47.9% between 2008 and 2012E.C in the region. Demand for TVET College is also growing as a result of the higher enrollment. Nearly, 528 students

per TVET College in 2008 are lower than 553 students per college in 2012. An enrollment has increased at TVET colleges since 2008.The number of TVET colleges and TVET teachers are the key determinant of student enrollment in TVET. The TVET institution has a potential in implementing training as per the 2008 TVET strategy which clearly indicated requirement.

The TVET College has to be taken care for trainers to succeed COC examination. In the COC summative assessment, if the students succeeded, they will be evaluated as "competent" and otherwise "not yet competent". All the teachers indicated that the key element in teacher competency is technical skills, and this can be improved through in-service training. The teachers are competent in both technical knowledge and teaching. There was lack of competent candidates for TVET teachers, particularly A-level teachers.

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7. Annexes

Table 1.2 Crop Production and Area Under Crop,2009-2011

Year	Types of Major Crops	*Area In hectares*	*Production In Quintals*
2009	*Cereals*	4,792,014	127,719,932
	Pulses	610,299	12,337,136
	Oilseeds	310,646	3,836,584
	Vegetables	100,828	3,089,940
	Root Crops	81,677	18,097,002
	Fruit Crops	27,804	1,768,824
	Chat	162,184	1,305,332
	Coffee	464,425	3,173,159
	Hops	3,389	86,048
	Sugar Cane	8,142	3,433,346
2010	*Cereals*	10,411,862	130,616,624
	Pulses	985,158	24,781,026
	Oilseeds	364,068	3,177,772
	Vegetables	100,580	10,930,741
	Root Crops	25,881	2,233,196
	Fruit Crops	55,479	338,246
	Chat	135,364	68,233
	Coffee	_	_
	Hops	4,483	48,120
	Sugar Cane	3,717	54,655
2011	*Cereals*	4,303,486	102,027,317
	Pulses	1,416,750	8,306,974
	Oilseeds	366,176	2,521,730
	Vegetables	92,852	5,172,454
	Root Crops	33,124	2,710,960
	Fruit Crops	8,299	15,278
	Chat	_	_
	Coffee	_	_
	Hops	5,517	92,649
	Sugar Cane	72,262	577,422

Source: 2008 and 2009 (CSA) and 2010 –2011 (OPDC) E.C

Functionality Rate of Water Schemes calculated by dividing the number of functional water schemes by the number of total water schemes in a given year, mathematically;

$$\text{Functionality Rate of Water Schemes} = \frac{\text{The number of functional water schemes}}{\text{Total water schemes in a given year}} X100$$

Method of Calculation and Interpretation

The indicator is computed for both urban and rural areas by dividing the number of people who use an improved water source by the total urban or rural population and multiplying by 100.

$$\text{Potable Water Coverage} = \frac{\text{Population supplied with potable water}}{\text{Total population}} X100$$

Table 2.1. Oromiya Zones Potable Water Coverage, 2003-2011 E.C

Zones	Potable Water Coverage								
	2003	2004	2005	2006	2007	2008	2009	2010	2011
Arsi	53	54	69	85	87	56	58	60	57
Bale	50	49	56	90	75	40	56	54	40
Borena	59	57	69	81	87	44	49	41	47
Buno Bedelle							69	72	69
Guji	43	46	65	91	84	48	45	58	64
East Hararge	50	51	58	77	76	47	51	51	55
West Hararge	45	44	58	91	81	47	57	48	61
Ilu Aba Bor	63	63	78	84	89	64	64	66	73
Jimma	51	63	79	86	99	72	71	69	72
East Shewa	72	67	83	84	92	72	78	65	75
North Shewa	61	71	86	77	97	68	69	85	67
West Guji							59	48	57
Southwest Shewa	52	64	63	80	89	52	61	59	59
West Shewa	45	46	68	72	89	60	63	67	59
East Wollega	67	73	82	78	95	68	69	69	79
West Wollega	66	66	86	81	94	64	69	61	77
West Arsi	52	58	73	80	85	54	63	55	51
KellemWollega	48	62	78	82	95	58	58	63	68
Horo Guduru	43	54	72	67	89	67	69	55	73
F/S/O/Special Zone	63	70	81	75	95	71	74	62	54
Total	**54**	**57**	**71**	**82**	**88**	**58**	**63**	**64**	**63**

Source: Water, Mineral and Energy Bureau of Oromiya, 2003 - 2011 E.C

Table 3.3. Length of Asphalt and Gravel Roads by Zones, 2008-2011 E.C

Zones	Road Length (KM)							
	Asphalt Road				Gravel Road			
	2008	2009	2010	2011	2008	2009	2010	2011
Arsi	161	188	188	189	3489	3652	3781	3,828
West Arsi	370	370	374	357	1684	1684	2248	2,248
Bale	73	73	73	86	3354	3354	3488	3,507
Borena	320	343	348	345	1711	1189	1411	1,413
Guji	235	229	236	252	2493	2590	2021	2,191
Finfinne Surrounding Oromia Special Zone	358	358	343	258	3196	3196	3024	1,662
East Hararge	181	181	210	212	5411	5411	3563	3,630
West Hararge	185	185	173	176	1571	1571	1610	1,587
Horo Guduru Wollega	93	93	101	125	1352	1352	1570	1,546
Ilu Aba Bora	275	275	209	208	2783	2783	1425	1,600
Jimma	362	362	416	416	1826	1826	3024	3,015
KelemWollega	119	119	124	123	1247	1247	818	1,010
East Shawa	652	695	723	902	2476	0	2052	2,261
North Shawa	204	209	207	207	1467	1459	1314	1,561
South West Shawa	141	141	138	147	1522	1522	1641	1,569
West Shawa	261	261	263	255	3600	3600	902	2,524
East Wollega	198	198	206	240	1514	1514	2227	2,255
West Wollega	339	261	365	367	2031	3600	2366	2,360
BunoBedele	0	151	139	145	0	991	1007	1,102
West Gujii	0	263	86	82	0	699	1163	1,143
Total	**4524**	**4951**	**4921**	**5092**	**42,726**	**43,240**	**40,655**	**42,012**
Average	251	248	246	255	2136	2162	2033	2101

Source: Oromia Planning & Development Commission, Statistical Abstract 16th to 19thedition published from 2017 to 2020

Table 3.4. Length of All Weather and Dry Weather Roads by Zones, 2008-2011 E.C

Road Types	Road Length (KM)							
	All weather				Dry weather			
Zones	**2008**	**2009**	**2010**	**2011**	**2008**	**2009**	**2010**	**2011**
Arsi	3650	3840	4010	4,093	1107	1476	1351	1,441
West Arsi	2054	2054	2736	2,720	2624	2624	2095	2,081
Bale	3374	3374	3583	3,747	940	940	1307	1,243
Borena	1530	1532	1759	1,762	544	1467	1219	453
Guji	2682	2819	2276	2,609	1216	1216	1017	472
Finfinne Surrounding Oromia Special Zone	3428	3428	3571	2,099	335	335	431	658
East Hararge	3682	5591	3773	3,865	1910	1910	460	425
West Hararge	1756	1756	1593	1,770	1608	1608	500	522
HoroGuduruWollega	1108	1108	1675	1,675	316	316	456	555
Ilu Aba Bora	2607	3058	1637	1,813	1879	557	1184	852
Jimma	1992	1992	3986	3,501	1393	1393	945	2,333
Kelem Wollega	1366	1366	1069	1,208	557	557	390	444
East Shawa	2778	695	2993	3,433	1149	1514	1372	1,093
North Shawa	740	1407	1550	1,800	931	175	619	472
South West Shawa	1543	1543	1958	1,734	630	630	612	872
West Shawa	3173	3861	1180	2,796	1736	1736	729	768
East Wollega	1583	1583	2483	2,545	1223	1223	564	541
West Wollega	2268	3861	2741	2,731	805	1736	871	1,083
Buno Bedele	0	1142	1284	1,248	0	854	717	849
West Gujii	0	962	1631	1,375	0	1329	232	593
Total	**41313**	**46971**	**47487**	**48524**	**20900**	**23596**	**17070**	**17750**
Average	***2295***	***2349***	***2374***	***2426***	***1045***	***1180***	***853***	***887***

Source: Oromiya Planning & Development Commission, Statistical Abstract 16th to 19thedition published from 2017 to 2020

Table 3.5. Road Length in KM Number of Population and Area of Land in KM^2 by Zones- up to 2011 E.C

Zones`	All weather Road	Population Number	Area of Land in km^2	Road Density per popn	Road Density per Land in km
Arsi	4,093	3,672,443	21,008	1.11	195
West Arsi	2,720	2,893,784	12,767	0.94	213
Bale	3,747	1,902,966	63,555	1.97	59
Borena	1,762	548,986	55,711	3.21	32
Guji	2,609	1,488,580	32,166	1.75	81
Finfinne Surrounding Oromia Special Zone	2,099	1,057,527	4,808	1.98	437
East Hararge	3,865	3,758,076	26,311	1.03	147
West Hararge	1,770	2,583,095	17,779	0.69	100
Horo Guduru Wollega	1,675	799,483	7,868	2.1	213
Ilu Aba Bora	1,813	960,885	10,920	1.89	166
Jimma	3,501	3,619,410	18,696	0.97	187
Kelem Wollega	1,208	1,090,760	10,487	1.11	115
East Shawa	3,433	2,263,250	9,546	1.52	360
North Shawa	1,800	1,638,949	8,990	1.1	200
South West Shawa	1,734	1,274,760	5,812	1.36	298
West Shawa	2,796	2,753,399	14,371	1.02	195
East Wollega	2,545	1,707,641	14,103	1.49	180
West Wollega	2,731	1,895,596	13,131	1.44	208
BunoBedele	1,248	815,127	5,964	1.53	209
West Gujii	1,375	1,231,224	9,383	1.12	147
Total	**48,524**	**37,955,939**	**363,376**	**1.28**	**134**
Average	***2426***			**1.47**	**187**

Source: Computed by the author based on Data of OPDC, SA Yearly published.

Table 3.8. Rural and Urban with all-weather Road Densities per Land Area by Zones, up to 2011E.C

	Rural			Urban			Total		
Zones	Rural Road	Rural Population	Road Density per population	Urban Road	Urban Population	Road Density per population	Total Road	Total Population	Density per pon
Arsi	3774	3,170,996	1.19	320	501,447	0.64	4093	3,672,443	1.11
West Arsi	2400	2,364,583	1.01	320	529,201	0.6	2720	2,893,784	0.94
Bale	3109	1,629,430	1.91	638	273,536	2.33	3747	1,902,966	1.97
Borena	1750	490,835	3.56	12	58,151	0.2	1762	548,986	3.21
Guji	2471	1,294,811	1.91	138	193,768	0.71	2609	1,488,580	1.75
FSOSZ	1016	615,698	1.65	1083	441,829	2.45	2099	1,057,527	1.98
East Hararge	3744	3,402,221	1.1	121	355,855	0.34	3865	3,758,076	1.03
West Hararge	1667	2,319,176	0.72	104	263,919	0.39	1770	2,583,095	0.69
HoroGuduruWollega	1646	693,290	2.37	29	106,192	0.27	1675	799,483	2.1
Ilu Aba Bora	1694	836,114	2.03	118	124,771	0.95	1813	960,885	1.89
Jimma	3080	3,195,179	0.96	421	424,232	0.99	3501	3,619,410	0.97
KelemWollega	1180	965,641	1.22	28	125,118	0.22	1208	1,090,760	1.11
East Shawa	2375	1,306,517	1.82	1058	956,733	1.11	3433	2,263,250	1.52
North Shawa	1661	1,447,001	1.15	140	191,948	0.73	1800	1,638,949	1.1
South West Shawa	1556	1,121,902	1.39	178	152,858	1.16	1734	1,274,760	1.36
West Shawa	2659	2,383,110	1.12	137	370,289	0.37	2796	2,753,399	1.02
East Wollega	2518	1,442,149	1.75	27	265,492	0.1	2545	1,707,641	1.49
West Wollega	2595	1,655,008	1.57	136	240,588	0.57	2731	1,895,596	1.44
BunoBedele	1240	734,279	1.69	8	80,848	0.1	1248	815,127	1.53
West Gujii	1346	1,132,067	1.19	29	99,157	0.29	1375	1,231,224	1.12
Total	**43,479**	**32,200,007**	**1.35**	**5044**	**5,755,931**	**0.88**	**48,524**	**37,955,939**	**1.28**
Average			**1.57**			**0.73**			1.47

Source: Computed by the author based on Data of OPDC, SA Yearly published

Table 3.9. Rural and Urban All weather Road Density per population by Zones, up to 2011 E.C

	Rural			Urban			Total		
Zones	Road	Areas km ^{2}	Road Density per Area	Urban Road	Urban Areas km ^{2}	Road Density per Area	Road	Areas km ^{2}	Density per Land
Arsi	3,774	20,987	180	320	21	15,224	4,093	21,008	195
West Arsi	2,400	12,690	189	320	77	4,152	2,720	12,767	213
Bale	3,109	63,502	49	638	53	12,038	3,747	63,555	59
Borena	1,750	55,695	31	12	16	736	1,762	55,711	32
Guji	2,471	32,114	77	138	52	2,650	2,609	32,166	81
FSOSZ	1,016	4,536	224	1083	272	3,989	2,099	4,808	437
East Hararge	3,744	26,297	142	121	14	8,641	3,865	26,311	147
West Hararge	1,667	17,770	94	104	9	11,548	1,770	17,779	100
Horo Guduru Wollega	1,646	7,863	209	29	5	5,686	1,675	7,868	213
Ilu Aba Bora	1,694	10,904	155	118	16	7,266	1,813	10,920	166
Jimma	3,080	18,637	165	421	59	7,175	3,501	18,696	187
KelemWollega	1,180	10,470	113	28	17	1,643	1,208	10,487	115
East Shawa	2,375	9,373	253	1058	174	6,096	3,433	9,546	360
North Shawa	1,661	8,977	185	140	13	10,511	1,800	8,990	200
South West Shawa	1,556	5,799	268	178	13	13,696	1,734	5,812	298
West Shawa	2,659	14,361	185	137	10	13,674	2,796	14,371	195
East Wollega	2,518	14,073	179	27	30	889	2,545	14,103	180
West Wollega	2,595	13,050	199	136	81	1,682	2,731	13,131	208
BunoBedele	1,240	5,956	208	8	9	952	1,248	5,964	209
West Gujii	1,346	9,371	144	29	12	2,417	1,375	9,383	147
Total	**43,479**	**362,424**	**120**	**5044**	**952**	**5,298**	**48,524**	**363,376**	**134**
Average	**2,174**		**163**			**6533**	**2,426**		**187**

Source: Computed by the author based on Data of OPDC, SA Yearly published