

## Analysis of Gender and Digital Divide from 2000- 2014 in Ethiopia

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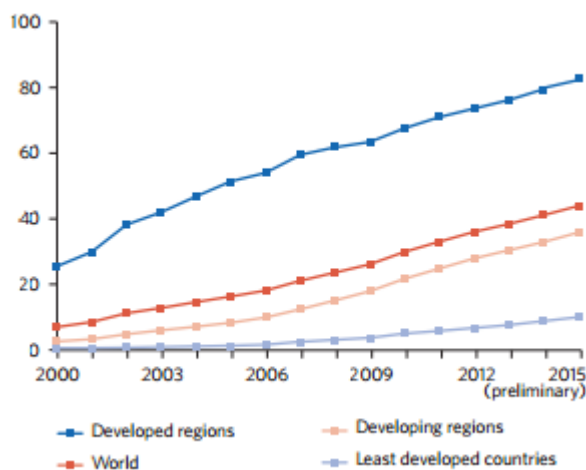
### ABSTRACT

The digital divide manifests the unbalanced growth between developed and developing world. This paper analyzed the existing digital divide through retrieving data in the period of 2000 - 2014 in Ethiopia. The result revealed that a huge gap in sex-disaggregated information appeared in Ethiopia. In addition, poverty, education and infrastructural development significantly affected accessibility, use and skill discrepancy in ICT between the genders. The digital divide trajectory is diminishing over time as the educational attainment and level of income increasing.

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### Introduction

In the modern time that we think of everything is advanced, gender inequality still exists in various forms all over the world. According to global gender gap report based the available data on 111 countries, the current economic participation and opportunity gap have reached 60% across the world and most of the positions with the lowest source of income and not professional jobs are occupied by women [1]. Since establishing the issue of gender equality and empowerment as the backbone of the millennium development goal in 2000, which put a milestone for all member states to give focuses, the MDG has brought a change in decreasing women's illiteracy rate, increasing educational enrollment, and reducing the involvement of women and girls in hazardous works has shown a significant change. However, despite those significant changes the gender gap in poverty, literacy and earnings still persist as a serious problem in the developing world [2].



**Fig 1. Data reported from MDG in 2015**

The opportunity of accessibility and use of information communication technology (ICT) has a huge gap among the different regions of the world.

As in the above graph showed, the gap in use of ICT between the least developed and developed regions are very big and the trajectory of the graph indicates instead of narrowing the gap in between the regions, it is widening its trend of difference [2][3]. One-third of the population in the developing countries uses the internet in relative to 82 percent of the developed regions [2].

The overwhelmingly rapid development of ICT is triggering change in the economic production system, social structure, personal interaction, getting information on fundamental decision issues of individual life, accesses to and usage of information and knowledge, business and government conditions, people's work behavior and ways of spending people's leisure time [4]. The existing innovation and expansion of ICT in the current century is transforming the household interaction and relationship among the whole family. Moreover, the spread of ICT to the society has a great contribution in narrowing the inequality between men and women. The rise in the socio-economic importance of ICT across the globe creates a special opportunity in fighting the already existed gender inequality [5] [4]. The internet gender gap in India, Mexico,

Egypt, Uganda is 27.4%, 10.2%, 17.5%, 46.2% respectively. The flourishing of internet penetration builds an opportunity to establish market linkage, provides a concrete benefit in education and searching job opportunities [6].

Education and literacy are the cornerstones of ICT implementation and adaptability. Information communication technology contains various applications and systems to transformation, process and develop information. The level of distribution of education in the worldwide among the developed, developing and underdeveloped region of the globe is absolutely uneven which spur an influence on the adaptability and accessibility of ICT among those regions. The General assembly held in June 2000 to review progress in the implementation of Beijing declaration and the Platform for Action, member states reveals the main hindrance of ICT and the internet equal diffusion and transmission between gender

are a lack of access and opportunity, poverty, Illiteracy, and language barrier [7].

Although the digital divide based on gender is manifested all over the universe, it is more magnificent in the developing region than the developed world; particularly in the sub-Saharan African countries, there are more marginalized women than men. In the sub-Saharan Africa (SSA) countries, the few urban dwellers, educated people, higher and middle-income group have more access opportunity to ICT, however, the majority of women's living in the rural area, are illiterate, and poor [8]. Moreover, the relevance of the content of the information which is disseminated through the internet and the people's interest to know about the issues on the internet have a strong relationship as well as designing the information in the way the rural community can understand the information [8][9].

After the Beijing conference and setting millennium development goals, many developing countries including Sub-Saharan (SSA) countries are working in bridging the gender gap [2]. In this paper, I will reveal the holistic digital gender divide in Ethiopia from 2000-2014 through analyzing data from different official sources.

### **Theoretical Perspectives and Conceptual Framework Digital Divide and ICT Development from various Theoretical Perspectives**

The usage of digital media for a bulk of purpose across the globe is leaping forward with the fast development and expansion of ICT in every corner of the world. However, due to socio-political and economic reasons, the magnitude of spread is different from continent to continent, region to region, society to society, among different income level etc. We employed various theoretical approaches to explain the relationship, purpose and the gap in between the digital media accessibility and gender inequality in SSA in the case of Ethiopia.

The explosive evolution of ICT across time contributes to the increasing demand and application of technology supported communication and interaction among people. The spread of ICT breaks the barriers of distance and brings change in a wide variety of social structures. It treats people through creating awareness and providing current information without discrimination of gender, income, race, ethnicity etc. Social network theory states that the type of relationship an individual have to one another and its attitudinal or behavioral effect on the individual or group of individuals within the network [10]. The need of individual tie escalates the importance of ICT. A person within a high-income community is inevitable to be influenced by a new technology like a new product of advanced Company than an individual who are in the lower income level. At the same time, women who were segregated by the society and who did not enroll in the basic education are on the other leeward of the mountain. The more individual has an access to online digital media have a huge opportunity to get entrepreneur network, skill, capacity building, employment opportunity, and expanding their social capital through the networks created online. Human capital theory explains employee's job satisfaction, commitment to their job, higher and fast communication skill, up to date managerial and implementation ability so on, are the merit of workers who frequently access the internet. The increase in earnings related to using internet technology is an indication of status or competency [11]. Many famous accredited universities across the globe are offering various courses to students through the internet. This may support to narrow the

gap between male and female educational inequalities that had existed throughout human history, and uncountable number of men and women are earning income through working online while they are at home. Social exchange theory explains the relation of individuals or a group of individual behavior relays on the cost-benefit analysis of the communication and the benefits are not in cash but social advantages like opportunities, prestige, conformity and acceptance [10]. The provision of various types of internet opportunities in both easiness and cost effectiveness to the society allows expanding the accessibility of online resource without discrimination on the ground of race, gender, geographic distance, and rural-urban dichotomy. In addition, having the means to surf the internet like a computer or Smartphone is not enough to access online resources; it still needs internet expansion infrastructure.

Social cognitive theory, on the other hand, states the impact of an external human activity on the individual behavior, practice, and activity through observational learning and explicit capability of human behavior [12]. Online media have a great impact on bringing ideological and attitudinal change on individual in the micro level and on the macro level of the whole society.

Social penetration theory states that as the relationship among individual develops, they become more familiar and intimate from time to time [13]. As the acquaintance expands into deeper condition, the individual start into commitment in between them, like based on the people's skill and educational background offering jobs, providing training and skill, introducing new technology and capacity building activities are among the few netizen would benefit from the penetration of ICT. ICT penetration to the society improves the communication frequency among individual, age group, gender, race and income groups by avoiding various expenses to meet each other and can communicate without stopping on-going business through online.

### **Country Profile**

Ethiopia is among the sub-Saharan low-income countries with a GDP of \$55.61 billion and a total population of 96.96 million, which make the second populous nation in the African continent. The country is rated among the fastest growing economy in Africa [14]. The majority of Ethiopian population (70%) lives in the rural area and their economy is depending on agriculture [15]. The gender gap in educational enrollment is very prominent; there are a number of men than women in all level of education. The majority of the population in Ethiopia never attend school, 48 % of women and 37% percent of men have never attended school. The wealth distribution gap among the rural and urban population is absolutely high and the total Gini coefficient of the country is 0.43, which varies in between the regions. The country is also characterized by a high number of young populations with 45% and 4 % of above the age of 64 [16]. It is obvious that if the above huge percentage of the young population is properly involved in the development policy and obtained a favorable condition for creativity, science, and technology, it is unquestionable that this generation is the main engine of development for the country.

### **Gender, Sex, and digital Divide**

Gender is socially constructed which are assigned to the social appearance of women and men. Gender refers to "the personal trait and social positions that member of a society attach to being female or male ... on the other hand, Sex is the natural biological reproductive characteristics of human

species". Sex refers to "the biological distinction between female and male" [17]. Gender role and its concept are developed within the culture of a society and reshape the behavioral attitude towards both sexes. The perception of a society determines the status and role division of the gender dichotomy, this perception is practically different from one society to the other.

The term "digital divide" refers to the differences in resources and capabilities to access and effectively utilize ICT for development that exist within and between countries, regions, sectors and socio-economic groups [18]. The digital divide is the valley created between the "Able" to use and access ICT and those "Unable" parts of the society due to various determinant factors.

### Methodology

This paper elucidated the major ICT indicators listed by ITU, World Bank world Development Indicators (WBWDI) and World Bank Africa development indicator (WBADI). Table 1 includes the list of indicators and the source of data which are compiled from the QUANDL database (<https://www.quandl.com/search?query=ethiopia>).

**Table 1. Indicators of Information Communication Technology (ICT).**

No.	Indicators	Source
1	Internet	
	Personal computers per 100 people	World Bank, world development indicator
	Internet users in %	World Bank, world development indicator
	Internet host density	World fact book
	Number of total female internet users	ITU
	Number of rural female internet users	ITU
2	Phone	
	Fixed broadband subscription per 100 people	ITU
	Fixed telephone subscription per 100 people	ITU
	Mobile cellular prepaid connection charge(Current LCU)	ITU
	Mobile cellular subscription per 100 people	ITU
	Telephone line	World Bank, world development indicator
3	Percentage of electricity coverage	World bank, world development indicator

Table 2, showed the various demographic statistics and characteristics revealed from World Bank QUANDL database which is an open official data source located on the internet. In this paper health, Poverty and education are used as a determinant factor of ICT accessibility, use, and affordability. Although there are many missing data about the countries general profile, we answered four main questions Q1, what is the general phenomenon of the digital divide in between the two sexes? Q2 what are the impacts of gendered educational attainment disparity on digital divide? Q3, what are the contributions of levels of family income in widening digital divide? Q4, what are the interconnection between health and ICT?

### Data and Findings

The data on table 3 shows there are many women than men population and the number of population is growing fast throughout the sample years. The data concerning total population in the year of 2014 is empty for both male and female.

The data doesn't show the result for the indicators used for Educational attainment in the year 2000. However, the number of total secondary school enrollment from the age of 15 to 44 and total tertiary graduate in the country since 2005 shows an increasing fast growth rate. The data for the female total tertiary graduate in 2000 and 2014 is not available on the data source used in this paper, whereas the data from 2005 and 2010 revealed, the number of women tertiary level graduate increased by three-fold of the number in 2005, which shows the number of women educational enrollment is rising sharply. However, when we look at the number of men and women with the age of 15 up to 44 with no education the number still shows increasing for both genders. This is due to the lack of access to education in the country while the child under the age of educational enrollment reaches their age for schooling. The number of people who lives below 1.25\$ a day are decreasing while the number of people with 5\$ a day increasing across the sample year. The numbers of urban dwellers are also increasing in faster rate but the percentage in compare to rural resident population is very small. The trajectory on the number of total birth attendant by skilled health staff increased more than threefold of the number in 2000. However, the number is still very few in relative to the total number of population of the country which is delivering at home by traditional birth attendants.

**Table 2. Demographic distribution.**

N0.	Indicator	Source of data
1	Total population	World Bank Africa Development Indicators
	Male	"
	Female	"
2	Educational attainment	World Bank, world development indicators
	Secondary	"
	Tertiary	"
	Percentage of no education of female	"
	Percentage of no education of female	"
4	Poverty	World Bank poverty statistics
	Below 1\$	"
	Below 2\$	"
	Below 5\$	"
	Human Development index	World Bank Africa Development Indicators
5	Residence	World Bank poverty statistics
	Urban	"
6	Child delivery at home in percent	World Bank, world development indicators
7	Life expectancy at birth total	World Bank, world development indicators
8	Life expectancy at birth female	World Bank, world development indicators
9	Percentage of electricity coverage	World Bank world development indicator

The data in table 4 reveal that although the number of internet percentage users in relative to another country in Ethiopia is very low, there is a fast growing rate in the number of users. The personal computer distribution per 100 people in the year of 2000 and 2005 is also considered among the least in Ethiopia compare to the developed world. The gender disaggregated data concerning internet user is not available for Ethiopia. The distribution of fixed broadband subscription, fixed telephone subscription, mobile cellular subscription per 100 people in 2000 is almost none but from 2005, 2010 and 2014 shows a sharp increase.

**Table 3. demographic statistical distribution analysis (2000 – 2014)**

	2000	2005	2010	2014
<b>Total population (million)</b>				
Male	32.6	37.0	41.3	
Female	33.0	37.3	41.7	
<b>Educational attainment (1000)</b>				
Secondary total (age 15- 44)		4,613	6,493	9,179
Tertiary total graduate		29,581	102,133	
Tertiary female graduate		6,982	27,176	
Female illiterate (age 15- 44)		13,142	14,341	15,336
Male illiterate (age 15 - 44)		10,799	12,322	13,830
<b>Life expectancy at birth</b>				
Total	51.93	56.24	61.30	
Female	53.34	57.66	63.03	
Male				
<b>Poverty per day (million)</b>				
Number of people 1.25\$	36	30	29	
Number of people 5\$	65	75	85	
Human Development index	0.28	0.32	0.39	
<b>Total birth by professional (%)</b>	5.6	5.7	-	15.5
<b>Urban resident (%)</b>	17.6	20.1	22.9	
<b>Electricity coverage (%)</b>	12.17		23.00	

### Discussion

The data for this paper concerning the ICT development of Ethiopia in the five-year interval since 2000, 2005, 2010 and 2014 are charted from various official statistics. The limited distribution of the ICT parameter across the country and the two sexes showed us the existing gender gap in use, accessibility and the constraints in the ICT sector of Ethiopia. According to the data from the above table which enable us to see the various demographic indicators that can affect the use and accessibility of ICT. As table 4 showed us the expansion and distribution of electric city directly affects the development and accessibility of ICT. The overall result showed that the attention for gender-based data with regard to ICT remains low in Ethiopia. The same result has been revealed by [19]; in Kenya and Somalia gender disaggregated data concerning ICT were missing from the focus of ITU. However, the available data from the source showed, the digital disparity between the genders is narrowing over time.

### Gender, Education and digital Divide

Education plays a great role in establishing the ground for human development and particularly in instructing on the importance, application mechanism, world development trajectory through ICT, creating awareness and knowledge of ICT to the society. As table 3 shows, the total number of female in compared to overall male population, there are higher numbers of female population in Ethiopia.

However, the number of female secondary school enrollment and tertiary graduate is significantly lower than male [7] also found that women in developing country have less chance of attaining higher education in relative to men. The data also showed that the educational gap and the ICT use and accessibility in between the gender is narrowing. The attendance in secondary education and the number of total graduates basically affects the use of ICT skill and knowledge. [20][21], in their research revealed that digital divide is a serious problem in developing countries, particularly in Africa 20 countries (including Ethiopia) has below one percent internet coverage. The number of the female attendant in a secondary school in 2000 was very limited in compared to 2010; the number of percentage internet users and phone subscribers was raised simultaneously throughout the sample years (internet users, 2.9% in 2014 as of 0.02% in 2000). The gender gap in education directly affects the gender divide in digitalization. The majority of Ethiopians doesn't have access to education and female are more vulnerable to this situation than male [16].

In the current educational system of Ethiopia, English language teaching starts from grade one as one subject and computer as a course starts in secondary level in the majority of public school (not included private school) [22]. Therefore, the majority of a male and female graduate of tertiary level have at least a basic knowledge of computer system. However, due to the accessibility and affordability problems, this doesn't explain all graduate students have the skill to surf the internet.

**Table 4. ICT indicators statistical data (2000 – 2014).**

	2000	2005	2010	2014
<b>Internet</b>				
Personal computers per 100 people	0.09	0.39		
Internet users in (%)	0.02	0.22	0.75	2.9
Internet host density	0	87	167	
Number of total female internet users	-	-	-	-
Number of rural female internet users	-	-	-	-
<b>Phone</b>				
Fixed broadband subscription per 100 people	0	0.0001	0.0047	0.4883
Fixed telephone subscription per 100 people	0.35	0.8	1.04	0.85
Mobile cellular prepaid connection charge (Current LCU)	0	443.1	85	
Mobile cellular subscription per 100 people	0.03	0.55	8.26	31.59
Telephone line	231,945	610,347	908,882	820,000

It is obvious that men are more capable of going to nearby cities and towns and can get access to the computer host and internet service through internet café and internet house, but relatively women have less chance. In addition, table 4 shows, the number of individual with a personal computer in Ethiopia are very small and this determines the accessibility, use, and knowledge of the individuals. Urban population represents only 22.9 % as of 2010, which implies the majority of the populations in Ethiopia are rural dwellers. The urban female population have a better opportunity to knowledge and being familiar with ICT than the female counterpart who resides in the rural Ethiopia in which majority are characterized by no electricity and ICT infrastructural development, and many secondary schools don't have computers used for an educational support system. The digital divide is not only magnified in due to the educational disparity, but all the regions in Ethiopia don't enjoy the same level of connectivity [23].

Language barrier is also another impediment for the use of ICT in Ethiopia. English knowledge skill is a hindrance for the access and finding of the necessarily targeted data and content. As table 3 showed, the number of women educational enrollment increase, the percentage use of internet also (table 4) leap forward in every sample year that implies education is the key sources and intertwined with ICT development. According to [24] Ethiopia has been recognized among the least countries in life expectancy and education with a fast track of progress.

Ethiopia is a country with a very little focus on using ICT as a source of development and filling the gap and facing the challenge of gender inequality that existed throughout history in its cultural practices and the country is performing relatively little in mitigating the social, economic and political barriers of ICT for development [25].

#### **Poverty, Gender and digital divide**

Poverty is another determinant factor for the affordability of internet access and possessing the internet host among the household and the families in Ethiopia. The more the wealthier the household, the more they afford access to the internet through a various host like a personal computer, Ipad or through a phone. This result is in line with the outcome of [26], the economic condition of an individual is a crucial factor in determining the expansion of ICT. Table 4 showed that the rural versus urban ICT heterogeneity and the accessibility level show a huge polarization in between the rural and urban regions. This difference is also very descriptive to the gender gap in the rural and urban in which women are considered as belong to the domestic work, having less source of income, and perceived as they don't need ICT to accomplish their job. It is obvious educational attainment has a positive relationship with ICT use and improving personal wealth through transforming the source of income from agriculture (which is characterized hand to mouth farming) to professional employment that enables the female graduate to be decision makers and familiar with ICT technology.

In Africa, 34% of household have access to the internet and the accessibility is more limited in List developed countries which enjoy only 7% of internet access [27]. According to table 4, the percentage internet users in Ethiopia are very few (2.9% in 2014) and the country has the highest internet tariff payment, whereas the population income remains very low that restrains the people's affordability not only to the internet tariff payment but to pay the host of the internet. Due to the past culture of depriving and subordinating women and encouraging men to own wealth through opening various sources of income and prioritization in attending education, men are wealthier

than women (there are more impoverished women than men). Women with higher educational attainment are more internet users than men. [28][5], found that in many sub-Saharan Africa- including Ethiopia, assuming in the case of women and men are on an equal educational level, women are more active internet user than men.

#### **Health, Women and digital divide**

Marginalization of women based on stereotype, role definition, and social context exacerbated for the new form of gender digital divide. Table 3 showed, In Ethiopia, the majority of women are out of the information shell and only 15.5 percent of women have a chance to get birth by professional health attendants. However, due to lack of up to date information, the majority of women are forced to give birth by traditional birth attendants at home. ICT plays a great role in changing overall women's social-cultural and economic conditions, particularly to women who reside in a distant place from the healthcare center, ICT make easier and to obtain timely access through the telephone and online service, which is consistent with [29] which found majority of people in urban china use internet to seek medical help and avoid psychological stress. [30], revealed that in Bangladesh mobile phone ownership contribute to the coverage of vaccination in hard to reach rural and to street dwellers in urban areas. Women who have access to information and ICT technology are six times higher to deliver a child at the hospital than women who don't have access to ICT [16]. It is obvious that, due to cultural reasons and close interaction with the family member, women in Ethiopia are more responsible for the health of the family than men do. Therefore, the contribution of ICT to women is inevitably vital through providing information about health related prior medications, family planning, sign and symptom of the various disease, especially, in some culture due to lack of awareness about contraceptives, people are not psychologically ready to use it and avoid it as something bizarre. However, women are apparently more discriminated from access and use of the ICT than men in the country.

#### **Conclusion**

The main purpose of this paper is to explore the general situations of gender and digital divide in Ethiopia through retrieving official statistical data of the year 2000, 2005, 2010 and 2014. Employing the various demographic and ICT indicators (Internet, phone subscription...), this paper discussed the significant gender disparity and the contribution of ICT to fill the existing gender disparity in the country.

The above discussion showed education, poverty, and infrastructural development contributes to the gender digital disparity in accessibility, usage, and skills to be familiar with the new ICT technologies. The data from the official statistics also showed, there is a huge gender disaggregated data gap, which hinders to infer the comprehensive picture of the digital divide in between the gender in Ethiopia. Low number of educational enrolment in secondary and tertiary level of female in the academics ensures the obvious knowledge gap between the gender group, and proves the notion that expansion of the internet is hollow, unless the users are able to use it, access it and know its functional application, as well as the information meaningfulness to the users, are the two side of the coin. The poverty distribution in the country is also another factor that widens the gap in the ICT use and accessibility in between the gender group. This is mainly revealed as a constraint related to affordability of the internet and its host material such as Smartphone and personal computer.

As a recommendation, the concerned body (government and nongovernmental institutions, the community) should work to improve the gender educational enrollment rate and gap, the

level of poverty between the two sexes and should improve the source of income of women. [31], revealed that transforming the livelihood of women both in the formal and informal sector requires the involvement of their family and community. Although there is a fast growth of the country infrastructural and ICT development, the gender gap is widening from time to time, particularly manifested in the urban-rural ICT distribution disparity, which needs further research on this area. In achieving the millennium development goals, multidimensional strategies should be implemented in inculcating ICT in the educational curriculum from the grass-root level and homogeneously distributing the access than limiting to few areas, in order to avoid the language barriers various software should be developed based on the local language and the content should also prepare in the way that less educated people can understand it.

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