

# ICT INEQUALITIES AND E-LEARNING IN THE WAKE OF COVID-19 IN KENYA

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**ABSTRACT** *This paper analysis the inequalities that exist in the access to ICT facilities such as radio, television, computer, mobile phones, internet, and electricity that support e-learning platforms in Kenya. The paper is motivated by the March 2020 presidential directive of closing all learning institutions in Kenya in a bid to manage Covid-19. After the closure, some learning institutions embraced e-learning to reach out to the learners at home. The paper, therefore, sought to establish whether there is equity in terms of access to e-learning programs by all learners in Kenya regardless of the geographical location, area of residence(rural/urban), and purchasing power of their households. The paper used desktop review research design and analyzed data from Welfare and Monetary Survey (WMS) 1994, Kenya Integrated Household Budget Surveys (KIHBS) of 2005/2006 and 2015/2015 as well as Kenya Census data of 2009 and 2019. The results indicate that there is a high level of inequality in access to ICT facilities by level of household poverty, area of residence (urban/rural) and by county. The results also indicate that apart from the Radio, all other ICT facilities are more accessible in urban areas than in rural areas and thus e-learning disadvantages learners from rural areas and poor families. The paper recommends that since radio (stand-alone or in-built in mobile phones) is widely accessible by the majority of the learners both in rural and urban areas, the e-learning programs should be relayed much more by radio. There is also a need for the government to provide e-learning facilities such as electricity and internet to all regions to promote the use of internet-supported applications such as Microsoft teams, google meet, google class, Zoom, and Webinar among others, to enhance interactive e-learning programs to all learners across the country.*

**KEY WORDS:** *e-learning, ICT facilities, Inequality, Covid-19, Kenya.*

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## I. INTRODUCTION

The main use of ICT in education is to enhance access to information either by the learner or the teacher and to promote learner-teachers interaction in the case of distance learning. As the world rapidly embraces digital media, the role of ICT especially in education cannot be ignored. As Danies [1], asserts, ICTs have become building blocks in modern society and more particularly in the education sector as a means of enhancing reading, writing, and numeracy. UNESCO [2] also argues that ICT facilities such as radio, television, interactive voice response systems, emails, and teleconferencing have been used in education for different purposes. Sharma [3], and Sanyal [4], also added their voice by asserting that the education sector has hugely benefited from ICT facilities in the area of research as well as teaching and learning. Yusuf [5] also remarked that ICT greatly improves the quality of education. These assertions demonstrate that ICT is very important in the education sector. This paper, therefore, seeks to establish how access to ICT facilities promotes e-learning in Kenya especially this time of Covid-19 pandemic which resulted to the closure of all learning institutions in Kenya and further complicating the matters by clarions call by the presidents urging all Kenyan residents to stay at home to flatten the curve if Covid-19.

E-learning refers to the use of educational technology, electronic media as well as the use of information and communication technologies (ICT) in education. It also refers to learning facilitated by the use of electronic media such as television, radio, and internet-enabled devices. According to Bhattacharya and Sharma [6], e-learning is appropriate for distance learning and flexible learning. They further asserted that e-learning has benefits such as saving time and costs because it enables students to have access to educational materials all times. The use of ICT in education can be classified as e-learning, blended learning, and distance learning and the main ICT products available for e-learning includes; teleconferencing, email, audio conferencing, television lessons, radio broadcasts, interactive radio counseling, interactive voice response system, audiocassettes, and CD ROMs. This paper focuses on the availability of radio, internet, computers, electricity, mobile phones, and television and their effectiveness of promoting e-learning in Kenya during the time of Covid-19 when all learners are at home under the presidential directive f closing all learning institutions and the call to stay at home.

Kenya like any other country in the world is experiencing Covid-19 which led to the closure of all learning institutions. The closure of schools interfered with the traditional face-to-face teaching and learning at school level leading to some institutions embracing e-learning programs to reach out to learners while still at home. This is done by the use of radio, television, the internet (through applications such as Zoom, Microsoft teams, google meet, google class, webinar, etc.), computers, mobile phones, and electricity. The electricity is used to power such devices to facilitate teaching and learning. However, since the emphasis of e-learning as an alternative to face-to-face learning, little is known on the number of learners who are able to access such facilities. The absence of such information may lead to many learners left

out in the learning process hence promoting inequality in teaching and learning especially this period of Covid-19. This paper, therefore, sought to establish the trend of ICT inequality in Kenya and its effect on e-learning in the face of Covid-19.

The objective of this paper is to document inequality trends in e-learning ICT facilities in Kenya and assess the effect of this inequality on e-learning.

## II. LITERATURE REVIEW

ICT integration in education has been the dream of the government of Kenya. Even before the onset of Covid-19, Kenya has been undergoing a revolution in the ICT sector. This aimed at changing the way schools carries out the teaching and learning activities using the traditional face-to-face approach. The need to introduce ICT in school led to the establishment of The National ICT Policy for Education and Training [7]. The government of Kenya through vision 2030 intended to create an e-enabled and knowledge-based society by 2015. This led to setting up of ICT infrastructure in public tertiary, secondary and primary schools to revolutionize teaching and learning in schools. This was anchored on Session Paper No.1 of 2005 which gave prominence to ICT facilities in schools. The paper Session Paper No.1 of 2005 envisioned that all public schools should be provided with ICT facilities where students, teachers, and communities around the schools could acquire ICT skills to promote the knowledge-based economy by the year 2015 [8].

Studies by Manduku, Kosgey, and Sang [9], Laaria [10], and Otieno [11], have shown that even though the government put in place ICT infrastructure in schools, such facilities have not been fully utilized because most teachers have no capacity in terms of skills to utilize such skills. An evaluation report by the Ministry of Education 2019 on the implementation of Schools' Improvement Program (SIP) indicates that most schools were supplied with tablets/computers, but many of them do not utilize them to support teaching and learning. This implies that the National ICT policy on education of 2006 has not met its intended purpose .

Moore & Kearsley [12], and Young [13], argue that the use of ICT in schools enhances quality and accessibility of education especially distance education. They further argue that ICT increases the flexibility of delivering education in a way that learners can access education at anytime and anywhere. Such argument holds water especially this time of Covid-19 where all the learning institutions have been closed and therefore hindering face-to-face learning hence embracing ICT or e-learning to keen learners in learning mood while at home. Introduction of ICT in the education sector aimed at reaching out to learners from all geographical regions hence making education accessible to all learners regardless of area of residence, economic status, age, and gender. The Use of ICT enables learners to browse through e-books, sample examination papers, previous year papers as well as get in contact with teachers and resource persons worldwide. According to Young [13], ICT also allows the disadvantaged groups as well as international students to be reached out by educational institutions to make education accessible to all.

The government of Kenya through the Ministry of Education initiated e-learning programs in primary and secondary schools since the 1970s. However, since then only the radio program has been running in Kenya Broadcasting Corporation radio station. After the emergence of Covid-19, the Ministry of Education through Kenya Institute of Curriculum Development (KICD revamped both radio and television programs intending to reach out to over 15 million learners in primary and secondary schools who are at home due to presidential directive of closing schools to manage Covid-19. (<https://teacher.co.ke/ministry-of-education>). Despite the move to emphasize the use of television and radio programs for learners currently at home, little is known on the number of learners who are able to access radio, television, and internet-related application such as Zoom, Microsoft teams, google meet, webinar and google class which is commonly used by learning institutions to reach out to learners at home. These applications require the use of computers, mobile phones and electricity for them to be fully utilized. This paper there're sought to establish the inequality that exists on access to such ICT facilities by household in Kenya since 1994 and relate it to the effective utilization of e-learning programs that have proliferated during the time of Covid-19 .

### III. METHODOLOGY

This paper uses desktop review research design where existing literature on ICT is reviewed and secondary data analyzed from the 1994 Welfare Monitoring Survey II (WMS II), 2005 and 2015/16 Kenya Integrated Household Budget Surveys (KIHBS), the 2009 and 2019 Population Census data and other administrative data from economic surveys from 1994 to 2020 .

The Welfare Monitoring Survey II (WMS II) of 1994 covered a total of 1,258 clusters and involved 10,860 Households. This survey was a national representative and gathered data on Basic household characteristics, Education,

Health, Fertility, Non-wage household income, Household consumption expenditure Housing characteristics, etc .

The 2005/06 and 2015/16 Kenya Integrated Household Budget Surveys (KIHBS) were carried out at an interval of 10 years and each involved 13,430 households in 1,343 Clusters and 24,000 households in 2,400 Clusters respectively. This implies that they were also a national representative. They also collected data on household members, demographics, education, labour, health, fertility and mortality, child health and nutrition, information and communication technology (ICT) services, and domestic tourism at the individual level. They also collected data at household focusing on housing, water, sanitation and energy use, agricultural holdings, activities and outputs, livestock, household economic enterprises, transfers, income, credit, and recent shocks to household welfare, food security, justice, credit, and ICT at the household level .

The Kenya Population and Housing Census 2009 and 2019 involved complete enumeration of the population in Kenya in the two years. They were also carried out at an interval of 10 years. They captured demographic data for individuals at the household level and therefore since it is census exercise almost every individual in Kenya participated in the exercise.

### IV. RESULTS

This section highlights the analysis of data focusing on households' access to ICT facilities in Kenya and their effects on e-learning in the face of Covid-19.

#### 4.1 Access to Radio and e-learning programs

In Kenya, radio has been used to transmit audio lessons since 1963 through national broadcaster then Voice of Kenya (VOK). Since then, there has been a share fall and raise of such programs until 2005 when session paper No:1 of 2005 allocated radio and television programs channels to Kenya Institute of Curriculum Development to facilitate radio and television educational programs. However, access to radio programs has been a challenge for many households in Kenya. This is as illustrated in Figure 1

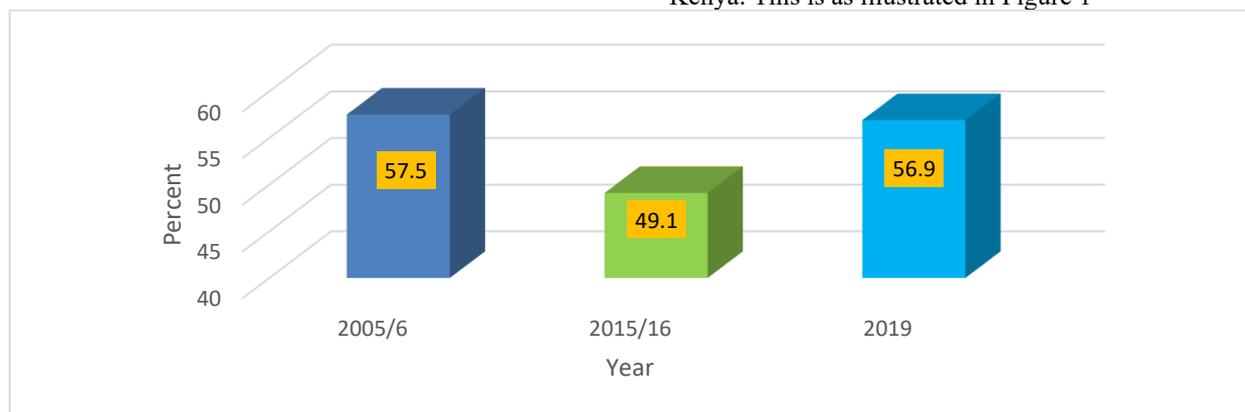


Figure 1

#### Trends of households' access to radio in Kenya

Figure 1 shows that 56.7% of households in Kenya own a radio in the year 2019. This implies that with the closure of schools as a result of Covid-19, children from 56.7 % of households in Kenya can enjoy educational radio programs while 43.1% of them have no access to radio programs.

Analysis by area of residence shows that rural areas have higher access to radio compared to urban at 58.5% and 54.4% respectively while analysis by region indicates that Nyeri, Nyandarua, Muranga, Kirinyaga, and Kisumu have higher access to radio in that order at the rate of 74.3%, 72.4%, 70.7%, 66.6%, and 65% respectively. However, in Turkana county, only 12.1% of households own a radio followed by

Marsabit, Tana River, West Pokot, and Lamu at 27%, 28.4%, 33.8%, and 37.3% respectively. This demonstrates that there is a high level of inequality in access to radio hence making radio programs ineffective method of e-learning in Kenya due to such inequalities .

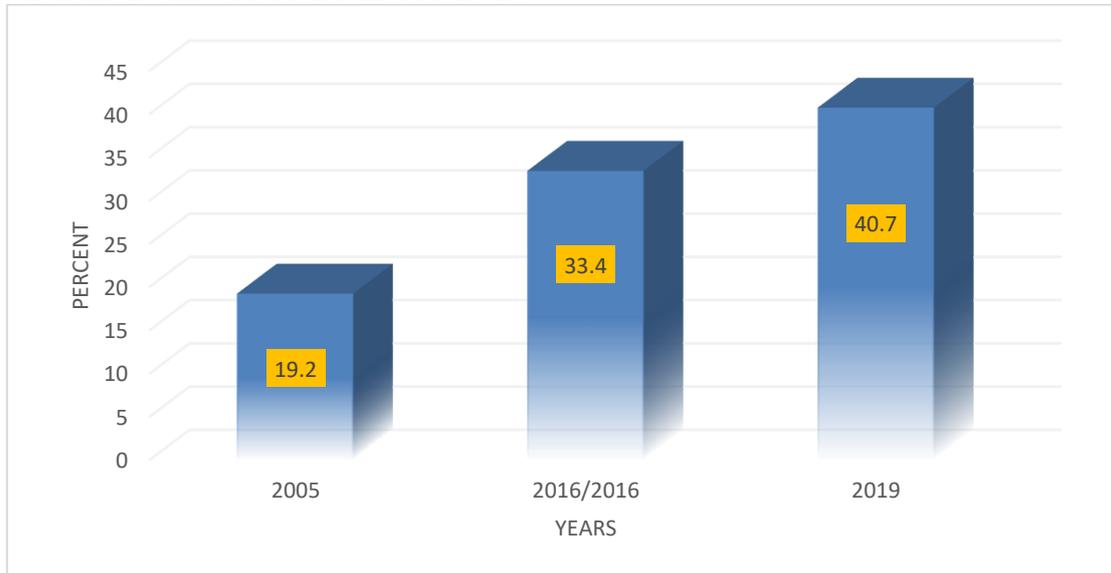
The results in Figure 1 concurs with an evaluation report on the utilization of radio programs by KIE (2012) which indicated that the utilization of radio programs declined from 84% in 2005 to 56% in 2008 and later 30.7% and 31.6% in 2010 and 2013 respectively. A similar evaluation by KICD in 2013 indicated that the radio program usage dropped to 23%. This implies that the usage of radio programs in schools is

low and consequently, the utilization of it at home is lower considering that there is no teacher supervision and initiative. Compounded by the inaccessibility of radio by 43.1% of households in Kenya in 2019, the implication is that many children are unable to follow radio programs while at home .

**4.2 Access to Television and e-learning programs**

Television is widely used in the educational sector especially for distance learning. Since its invention in 1843, it has been used both in households and educational institutions for

entertainment and educational purposes. With recent improvements, television has given rise to the interactive smartboard technology which can be manipulated by the classroom teacher to create and share the content with the learners. The KICD has been running TV programs for teaching students from primary to secondary schools through KBC and EDU television channels. Access to television in Kenya is as presented in Figure 2.



**Figure 2**

**Access to Television by households in Kenya**

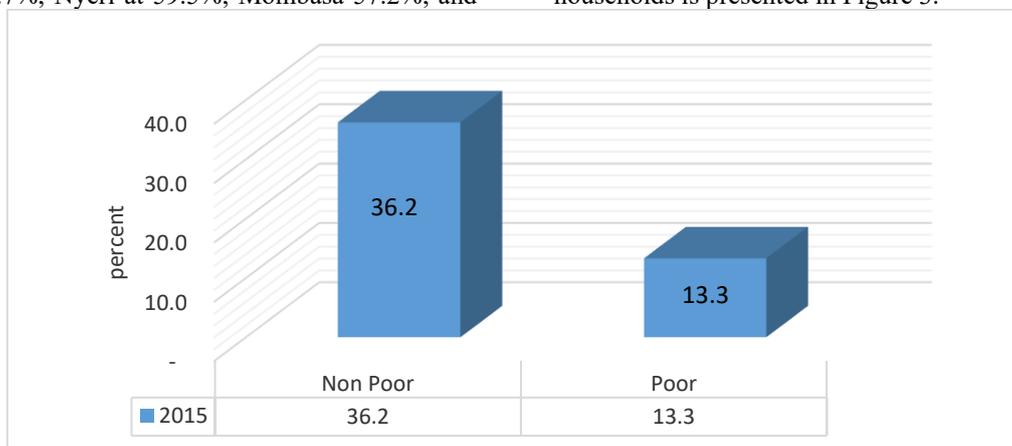
Figure 2 shows that despite the increase of ownership of television by households in Kenya, still, the figure is below 59% implying that around 59% of households have no access to television. The results also indicate that only students from 40.7% of households have access to television implying that the television educational programs by KICD could be accessible by learners from 40.7% of households in Kenya leaving out 59% of households .

Further analysis disaggregated by urban and rural areas indicates that only 26.9% of households in rural areas own televisions compared to 62.5% of households’ in urban areas. This implies that learners from rural areas are more disadvantaged in access to television educational programs. This is opposed to radio programs that favour learners in rural areas. Analysis by county indicates that Kiambu county has more households owning television at 70%. It is followed by Nairobi at 68.7%, Nyeri at 59.5%, Mombasa 57.2%, and

Kirinyaga at 54%. The counties with the least number of households owning television include Wajir with 6.6% and the rest are Turkana at 7.4%, Mandera 8.3%, West Pokot 9.7%, and Garissa 12.9%. This implies that for television educational programs learners from over 80% of households from five counties have no access to Television and consequently cannot benefit from the e-learning offered through television educational programs. It also implies that the television educational programs offered by KICD reach only 43.7 percent of households in Kenya.

**4.3 Access to internet and e-learning programs**

After the schools closed due to Covid-19, some learning institutions started offering online classes using applications such as google meet, Micro sift teams, google class, Zoom, and Webinar. These applications require internet connectivity. Access to the internet by the poverty level of households is presented in Figure 3.



**Figure 3**

**Access to the internet by the level of economic wellbeing**

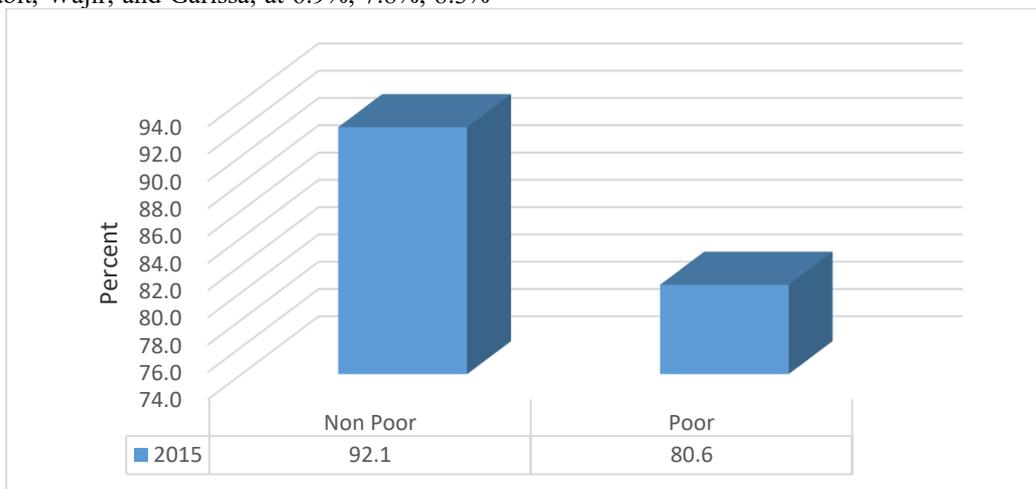
Source: Own calculations using KIHBS 2015/16

Figure 3 shows that around 13.3% of poor households have a connection to the internet compared to 36.2% of non-poor households in the year 2015. This implies that there is high inequality on access to internets and consequently to internet supported e-learning activities. Concerning households in rural and urban areas, results indicate that 22.6% of households are connected to the internet nationally while 42.5% of households in urban areas and 13.7% of households in rural areas are connected to the internet. This implies learners in urban areas have a higher chance to benefit from internet-connected learning activities

The results further indicate that in 2019 national census data Nairobi county leads other counties in terms of internet connectivity with 52.4% of households connected to the internet. Its followed by Kiambu, Mombasa, Kajiando And Machakos Counties At 42.7%, 39.2%, 33.1%, and 31.3% respectively. The counties with the least number of households with access to the internet include Turkana, Mandera, Marsabit, Wajir, and Garissa, at 6.9%, 7.8%, 8.3%

8.3% and 8.9% respectively. This implies that learners from over 90% of households in such counties have no internet connectivity. The results show that counties with the highest population living in urban areas have more access to the internet than the ones with a large population in rural areas. This consequently, implies that counties with a large population living in urban areas have a higher probability of utilizing e-learning facilities compared to those in rural areas

**4.4 Access to Mobile phone and e-learning programs**  
The use of mobile phones has revolutionized all sectors of the economy globally. Especially, according, Horizon, (2012) and Smartinsights, (2016) mobile phone applications constitute one of the six technologies used for higher education. Smartinsights, (2016) points out that 90% of online time is spent using mobile apps. However, phone ownership in Kenya by households varies from one region to another and by the economic status of people as illustrated in Figures 4 and 5



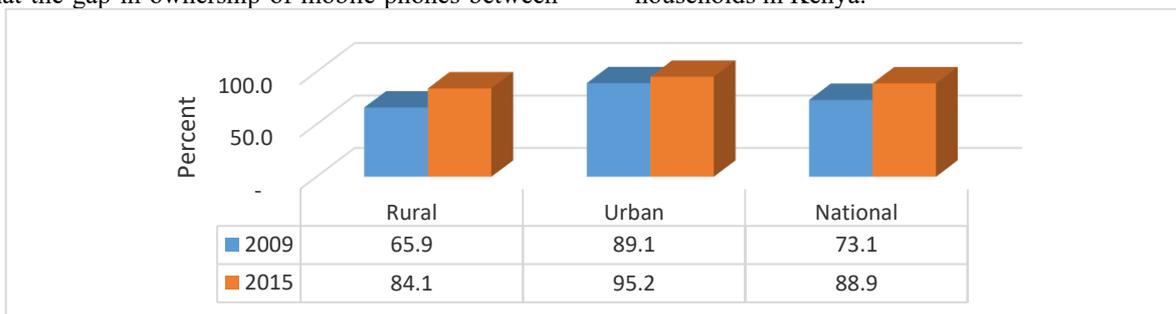
**Figure 4**

**Proportion of households with one member owning a mobile phone by poverty level of the household**

Source: Own calculations using KIHBS 2015/16

Figure 4 shows that 80.6% of poor households own a mobile phone compared to 92.1% of non-poor households. This implies that the gap in ownership of mobile phones between

the poor and the non-poor households is small. This is an indication that compared to other ICT facilities such as television and radio mobile phones dominate in over 80% of households in Kenya.



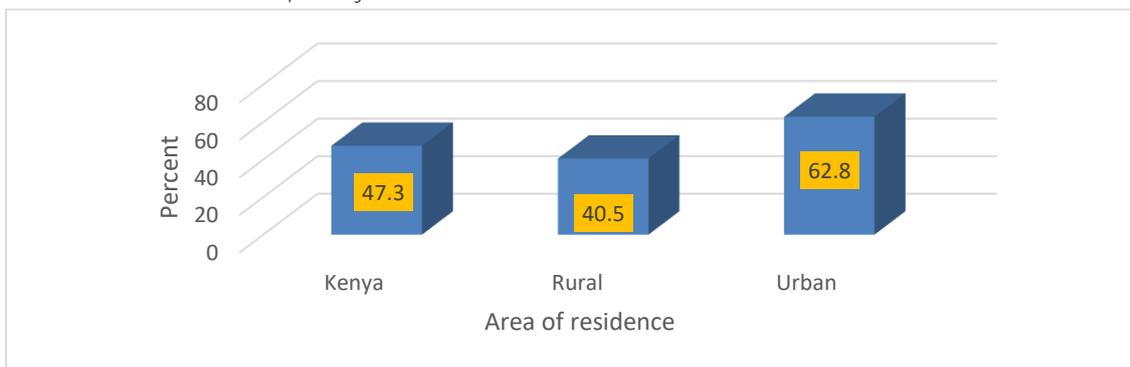
**Figure 5**

**Proportion of households with one member owning a mobile phone by area residence**

Source: Own calculations using KIHBS 2015/16 and 2009 Census data

Figure 5 shows that between 2009 and 2015, there was a tremendous increase in mobile phone ownership by households both in urban and rural areas. For instance, 65.9% of households in rural areas had one member of the family having a mobile phone in 2009 and in 2015 the number rose to 84.1%. This trend is observed in urban and at the national

level. This implies that as access to mobile phones is increasing, the gap in access to mobile phones by households in rural and urban areas is decreasing. However, since a mobile phone is a personal gadget unlike radio and television which can widely be shared by a majority of members of the household, this paper also analyzes the proportion of the population above age 3 with mobile phones. This is presented in Figure 6



**Figure 6**

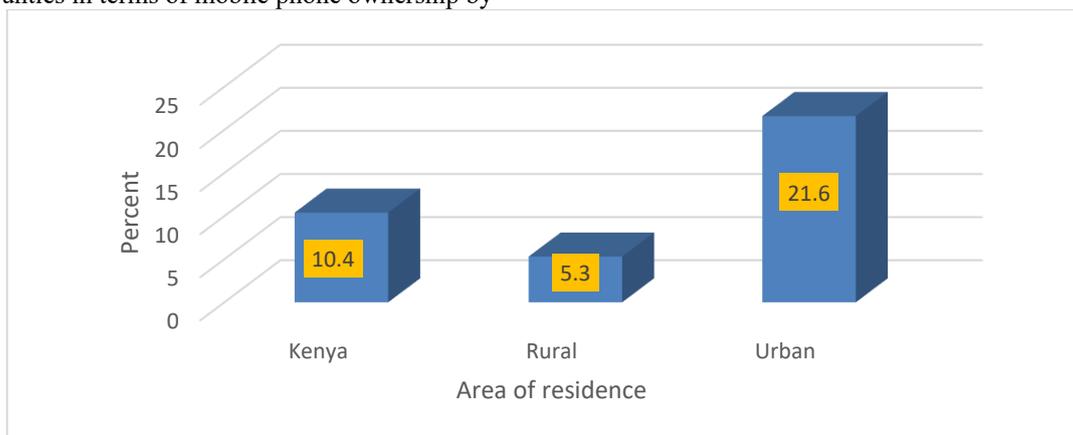
**Proportion of population above 3 years owning a mobile phone**

Source: Kenya census 2019 data

Figure 6 shows that 40.5% of people 3 years and above in rural areas own a mobile phone compared to 62.8% in urban areas. The national average is at 47.3%. This implies that 52.3% of the population aged 3 years and above in Kenya do not own a mobile phone. This hinders them from accessing e-learning programs transmitted by the use of mobile phones. Analysis by county indicates that Nairobi county has the highest population of age 3+ owning a mobile phone at 69.1%. It is followed by Kiambu at 66%, Nyeri 64.1%, Mombasa 61.8%, and Kirinyaga at 61.5%. The counties with the least number of households owning a mobile phone West Pokot at 21.1%, Mandera 27.4%, Turkana 27.7%, Wajir 27.9%, and Garissa 30.3%. These results indicate that in the bottom five counties in terms of mobile phone ownership by

a population of 3 years and above over 70% of them do not own mobile phones implies that they cannot fully utilize e-learning classes with the use of a mobile phone .

4.5 Access to Computer/Ipad and for e-learning programs Before the emergence of mobile phones, computers were widely used to support e-learning. In Kenya, computers are extensively used to support e-learning activities. Currently, after the emergence of Covid-19 learners are using computers to receive teaching and instructional materials from a teacher by use of applications such as Zoom, webinar, google meet, google class and Microsoft teams, etc. They also download internet materials for reading at home. However, the number of learners who have access to a computer in Kenya are few as illustrated in figure 7



**Figure 7**

**proportion of households owning a computer in Kenya**

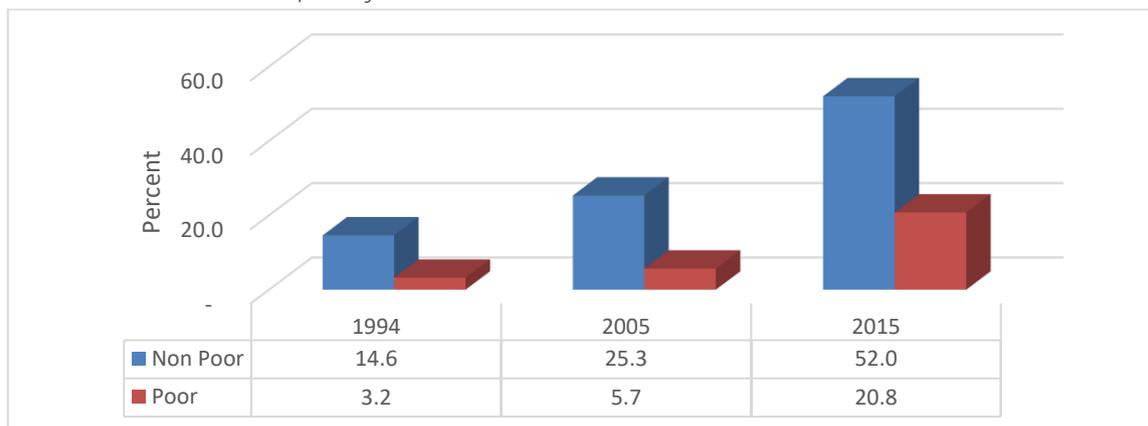
Source: Kenya census 2019 data

Figure 7 shows that in rural areas there are 5.3% of household who owns a computer as opposed to 21.6% of households in an urban area. The national average as per the 2019 census data was 10.4%. This implies that around 90% of households in Kenya have no computers and therefore this complicates the e-learning activities especially this time of Covid-19 where there is a government directive of people to stay at home and keep social distancing hence discouraging people to stay close to each other to share some ICT facilities. Analysis by county indicates that Nairobi leads the park with 28% of households owning a computer. Its followed by Kiambu at 21.8%, Mombasa 16.8%, Kajiado 16.2%, and lastly in the top 5 Nyeri county at 13.7%. In the least

category, Turkana has 2.4%, Mandera 2.7%, Wajir 2.9%, Marsabit at 3%, and West Pokot. This demonstrates a high level of inequality on ownership of computers by county. The results indicate that counties with most people in urban areas own computers compared to counties with the majority of residents living in rural areas. This implies that in some counties, e-learning by the use of computers can only be utilized by less than 90% of the population .

4.6 Access to Electricity and e-learning programs

All the e-learning support facilities require electricity for them to be functional. This paper also highlights the inequalities in access to electricity by regions and how it affects e-learning classes.



**Figure 8**

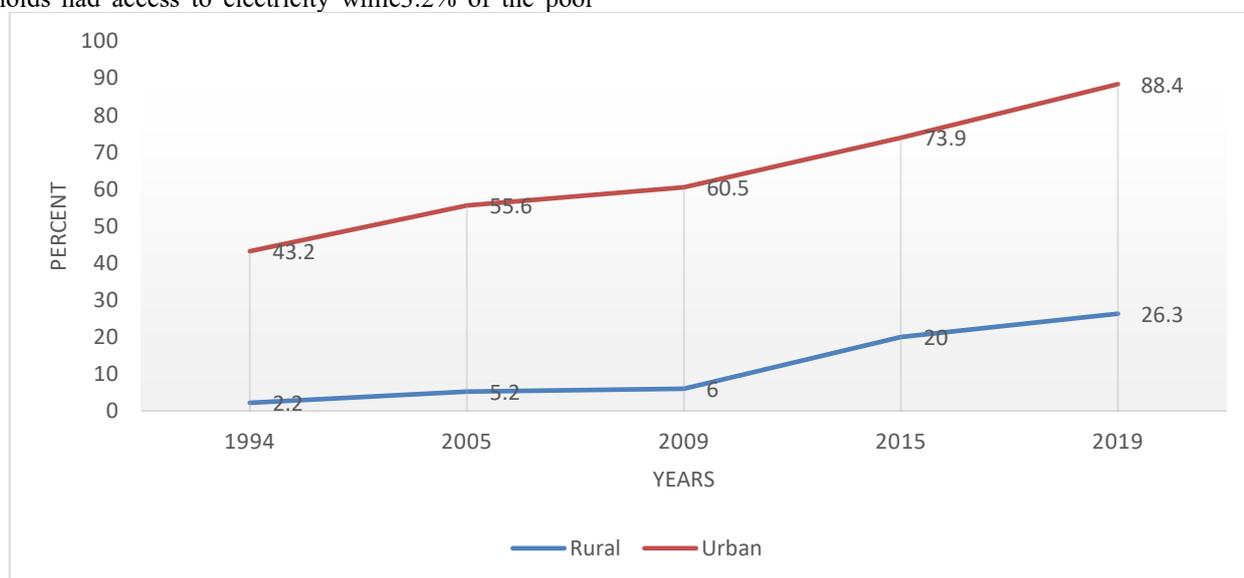
**Proportion of households with access to electricity by the level of poverty**

Source: Own calculations using 1994 WMS and KIHBS 2005/06 and 2015/16

Figure 8 shows that between 1994 and 2015, there has been a wide gap in access to electricity between the poor and non-poor households. For instance, 14.6% of non-poor households had access to electricity while 3.2% of the poor

did not have. In 2015, the trend was similar with 20.8% of the poor connected to electricity compared to 52% of the non-poor households .

A comparison of electricity connectivity by areas of residence is as indicated in Figure 9



**Figure 9**

**Proportion of households with access to electricity by area of residence**

Figure 9 shows that there has been a wide gap in electricity access between rural and urban households. For instance, in 1994 there were 2.2% of households in rural areas with electricity compared to 43.2% in urban areas. The trend is maintained in 2019 with 26.3% of households in rural areas connected to electricity compared to 88.4% in urban areas. This implies that learners in rural areas who constitute the majority of the population are not connected to electricity hence affecting the use of e-learning facilities that rely on electricity for their functionality .

The analysis by county indicates that Nairobi leads other top five counties in electricity connectivity at 96.5% followed by Kiambu 91.7%, Mombasa 85.9%, Nyeri 82.2%, and Kajiado 67.4%. the last five counties with electricity connectivity are West Pokot at 11.8%, Wajir 14.1%, Samburu 14.4%, Kitui 17.1%, and Homabay 18.4%. This shows that as some counties have over 70% of households connected to electricity, there are counties with over 90% of households without electricity connectivity. This reveals a high level of inequality in access to electricity and consequently the

utilization of e-learning programs geared towards reaching out to learners at home during the time of Covid-19.

**.5Conclusion**

The results in section 4 lead to the conclusion that between 1994 and 2019 there has been high level of inequality on access/ownership of ICT facilities (mobile phones, radio, internet, computers, television, and electricity) between the poor and non-poor households. The results also indicate that the inequality on access to such facilities is evident among the urban and rural households as well as by county. Generally, results indicate that the urban population has more access to the internet, computer, electricity, television, and mobile phones. However, access to radio is more in rural areas than in urban areas. This implies that all the e-learning programs supported by television, an internet-enabled application installed in computers and mobile phones are more available in urban areas than in rural areas. This implies that during this time of Covid-19 when learners are at home under the presidential directive of closing schools, keeping social distance and staying at home the learners in rural areas

are more disadvantaged in terms of utilizing e-learning programs compare to the learners in urban areas .

#### 5.1 Recommendations

Based on the findings, the paper recommends that since radio (standing alone or when in-built in mobile phones) is widely accessible by the majority of the learners both in rural and urban areas, the learning institutions, KICD and interested parties should transmit e-learning programs mostly using radio programs to promote equity in access to e-learning programs. The paper also recommends that the government of Kenya needs to provide e-learning facilities such as electricity and internet to all regions to promote the use of internet-supported applications such as Microsoft teams, google meet, google class, Zoom, and Webinar among others to enhance interactive e-learning programs to all learners across the country .

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