EFFECT OF DEVOLVED SYSTEM OF GOVERNANCE ON ECONOMIC DEVELOPMENT IN BUNGOMA COUNTY, KENYA

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DECLARATION

Declaration by Candidate

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DEDICATION

This work is dedicated to my mother Beatrice Mabonga for her encouragement, support and prayers. She once told me that our doubts are our traitors that make us lose the gain we often might win by fearing to attempt. Those words kept me going.

To my sons Milan and Eden, you gave me the strength to keep going and endure the challenges on undertaking this research study.

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ABSTRACT

Economic development in Kenya is undermined by corruption, poor economic policies and political instability. Kenya is among the countries in the world with highest inequality in income distribution with a significantly low proportion of Kenyans able to access to healthcare and education. This is despite the devolution of government functions that was meant to ensure that the delivery of public services to the people by the government is well coordinated and efficient. Majority of Kenyans are living in poverty. It is on the basis of this purview that the study sought to determine the effect of devolution of government functions on economic development in Bungoma county, Kenya. The specific objectives were to determine the effect of devolution of agriculture, education, health, trade, transport and water functions on economic development in Bungoma county, Kenya. The study was anchored on the theory of fiscal decentralization, the new growth theory and the theory of balanced growth. This study adopted both descriptive and explanatory research designs. The study population was 9 sub counties in Bungoma county. The sample size was 54 observations, comprising nine cross-sections (sub counties) for the period 2013 to 2018. Data was collected using secondary data sheets. The study adopted both descriptive and inferential statistical techniques to analyze the data collected. The multiple regression cross-section fixed effects model was used to analyze the panel data. The results were as follows; devolution of government functions has a strong relationship with economic development in Bungoma County, Kenya ($R^2 = 0.913511$), number of farmers supported per year has a negative but insignificant effect on human poverty index in Bungoma county, Kenya ($\beta_1 = -0.000100$, $p > 0.05$), the number of ECDE teachers/VTC instructors recruited negatively and insignificantly affects human poverty index in Bungoma county, Kenya ($\beta_2 = -2.63E-05$, $p > 0.05$), the number of medical practitioners recruited positively and insignificantly affects human poverty index in Bungoma county, Kenya ($\beta_3 = 0.000209$, $p > 0.05$), the number of stalls negatively and significantly affects human poverty index in Bungoma county, Kenya ($\beta_4 = -0.000812$, $p < 0.05$), the kilometres of access roads opened negatively and insignificantly affects human poverty index in Bungoma county, Kenya ($\beta_5 = -3.86E-05$, $p > 0.05$) and the number of water connections positively and insignificantly affects human poverty index in Bungoma county, Kenya ($\beta_6 = 1.04E-06$, $p > 0.05$). The study concluded that devolution of trade function positively and significantly affects economic development in Bungoma county, Kenya. Devolution of agriculture, education and transport functions positively and insignificantly affects economic development in Bungoma county, Kenya. Devolution of health and water functions negatively and insignificantly affects economic development in Bungoma county, Kenya.The study recommended that the government should allocate more funds to strengthen devolved trade, agriculture, education and transport functions in order to realize economic benefits. Moreover, the study recommends that the devolved health and water functions need to be strengthened to ensure that significant benefits are realized. The study is expected to assist the government and policy makers in allocation of public resources in the current era of devolution in Kenya.

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LIST OF ABBREVIATIONS AND ACRONYMS

ECDE Early Childhood Development Education

FD	Fiscal Decentralization
GDP	Gross Domestic Product
HDI	Human Development Index
HPI	Human Poverty Index
LED	Local Economic Development
MPCC	Multipurpose Community Centres
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
SADC	South African Development Community
UN	United Nations
USA	United States of America
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor
VTC	Vocational Training Centres

OPERATIONAL DEFINITION OF TERMS

Devolution of agriculture function

According to the Constitution of Kenya 2010, devolution of agriculture function refers to the shifting of responsibility for spending and service delivery in agriculture from the national government to the respective department in the county governments.In this study, the devolved agriculture function has been measured by the number of farmers supported by the county government.

Devolution of education function

According to the Constitution of Kenya 2010, devolution of education function refers to the shifting of responsibility for spending and service delivery in education from the national government to the respective department in the county governments. In this study, devolved education function has been measured by the number of ECDE teachers and VTC instructors recruited by the county government.

Devolution of health function

According to the Constitution of Kenya 2010, devolution of health function refers to the shifting of responsibility for spending and service delivery in health from the national government to the respective department in the county governments. In this study, devolved health function has been measured by number of medical practitioners recruited by the county government.

Devolution of trade function

According to the Constitution of Kenya 2010, devolution of trade function refers to the shifting of responsibility for spending and service delivery in trade from the national

government to the respective department in the county governments. In this study, the devolved trade function has been measured by the number of market stalls constructed by the county government.

Devolution of transport function

According to the Constitution of Kenya 2010, devolution of transport function refers to the shifting of responsibility for spending and service delivery in transport from the national government to the respective department in the county governments. In this study, the devolved transport function has been measured by the kilometres of access roads opened by the county government.

Devolution of water function

According to the Constitution of Kenya 2010, devolution of water function refers to the shifting of responsibility for spending and service delivery in water from the national government to the respective department in the county governments. In this study, the devolved water function has been measured by the number of water connections by the county government.

Economic development

It refers to the process which involves improving a country's economy both qualitatively and quantitatively, including politically and socially transforming the economy, hence leading to the transformation of low incomecountries into modern industrialised nations (Raju, 2011). In this study, the human poverty index has been used as the measure of economic development.

CHAPTER ONE

INTRODUCTION

1.0 Overview of the Chapter

This chapter presents study's background, research problem,the objectives of the study, the study's hypotheses,thesignificance of the study,the scope and limitations of the study.

1.1Background to the Study

When the central government devolves its functions, it implies that power is transferred to levels that are lowerin the hierarchy. This reduces top-down approaches in the making of decisions in government (Naeem, Nafees, Zahidie, Fatmi, &Kazi, 2012; Kauzya, 2007). Decentralization refers to the shifting of power to lower levels of government to ensure improved delivery of services (Edoun&Jahed, 2009).Decentralization can be administrative, political or fiscal; occurring independently or involving more than one dimension. In decentralizing administratively, responsibility for certain functions is transferred vertically to lower government levels.Also known as devolution, political decentralizationinvolves horizontal or vertical separation of powers and functions of government. Decentralizing fiscally entails the assignment of responsibilities for generating revenue to lower levels by the central authorities, which are sent back or spent locally(Martinez-Vazquez, 2011).

In East Java (Indonesia), Jumadi, Pudjiharjo, Maski and Khusaini (2013) found out that decentralization's effect on human development is positive and significant. However,

local economic growth is negatively affected by fiscal decentralization. According to Sepulveda and Martinez-Vazquez (2010) decentralizing government functions positively affects poverty and the human poverty index in Atlanta, United States of America (USA); but the effect is nonlinear. Moreover, decentralization by the government positively impacts income distribution when the size of the economic sector is relatively large (Sepulveda & Martinez-Vazquez, 2010).

Ina sample of 10 African countries, Dickovick and Riedl (2010) noted that the extent of economic development operations as well as its nature vary.Decentralization is considered critical in achieving economic development in African economies. The implementation of economic development strategies faces challenges as most central governments retain major responsibilities in determining lower-level government expenditures. Decentralized units of government have inadequate sources of revenue, in comparison to the expenditure functions that they are mandated to undertake in devolved systems(Dickovick&Riedl, 2010). Decentralization of functions of governmentin Africa is commonly in provision of services to the citizens in various sectors together withother duties in the development of local economies(Dickovick&Riedl, 2010).

Article 174 of Kenya's 2010 Constitution states that devolution is meant to enhance self-governance, development of the economy and sharing of resources equitably. It is expected that the governance of the country will be better and democracy would grow through devolution. Kenyans created 47 counties as a result of the quest for devolution. In the Kenyan counties, functions decentralization by the national government are

practised. Both administrative, political and fiscal decentralization happen to be in place in Kenya. This leads to improved growth and welfare of the people as opportunities are created locally through investments and initiatives by county governments (Ngundo, 2012). Sub-national governments play a key role in delivering and providing goods and services to the public in most countries of the world. It is very fundamental to understand how devolution of government functions impacts on various socio-economic issues. This includes ensuring that the delivery of public services is efficient, the growth in economy and investments is improving, the inequalities in distribution of income is reducing, regional economic disparities are reducing and macro economy is stable (Martinez-Vazquez, Lago-Penas&Sacchic, 2015).

The Constitution of Kenya 2010 stipulates the key functions of county governments which could be classified as agriculture, education, health, trade, transport and water functions, together with other roles.According to Raju (2011), economic development refers to the process of transforming the economy of a country with low income into a modern industrialisedeconomy. This transformation of a country involves improving both qualitatively and quantitatively. Both political, social and economic changes in a country are part and parcel of the development of an economy.Poverty reduction, improvement ofsocial welfare and reduction of income disparity are usually included by some economists in defining economic development. To develop the economy of a country, the rate of production and employment has to be increased. Therefore, the

growth of productive employment is an aspect which is also considered in defining the concept of development of a country's economy (Raju, 2011).

According to Kindleberger and Herrick (1958, as cited in Raju, 2011), an economy is developing when the material welfare of the citizens is improving, poverty among the massesas well as illiteracy, diseaseand early death which are the correlates of poverty are being eradicated, the country's input and output composition is shifting from agricultural to industrial production, people of the working age category are generally engaged in productive employment as opposed to afew citizens are widely involved in decision making regarding the direction in which their welfare moves.According to Omondi (2014), there is great inequality in wealth distribution in Kenya. This places Kenya among the economies of the world with the greatest inequality in distribution of wealth and income according to United Nation's (UN's)human development report. The UN reported that incomes of the wealthiest 20 per cent of Kenyancitizensincreased steadily in the past decade upto 11 times more than that of the poorest 20 per cent. The UN report noted that althoughthe level of wealth, access to healthcare and education had improved, a small percentage of Kenyans directly benefited. According to the report, each of the 42 million Kenyan citizens would get Sh189,624 ($2,158) every year if income distribution was equal, which is not the case (Omondi, 2014).

1.2 Statement of the Problem

Devolution of government functions is a critical strategy for promoting economic development in a country.Devolution ensures that the delivery of public services is well

coordinated and efficient. The devolution has resulted in effective planning for economic development needs of the people by leaders who understand the needs and priorities of the locals (Kannan, 2013; Edoun&Jahed, 2009).Despite the role played by devolution in economic development, majority of Kenyans are living in poverty.Kenya is eighth worldwide and sixth in Africa in terms of the largest proportion of the population living in extreme poverty. 29 per cent of the citizens are very poor. Their consumption is less than $1.90 daily. With a poverty escape rate of 0.5 people per minute, the drive to achieve the United Nation's Sustainable Development Goalsis at risk (Ochieng, 2018). Kenya is among the countries in the world with highest inequality in income distribution with a significantly low proportion of Kenyans able to access to healthcare and education (Omondi, 2014). Poor administrative capacity and insufficient revenues are thefactors leading to poor economic development. This leads to inability of county governments to provide adequate, quality and satisfactory services to the citizens. In the long run, poverty levels rise and the county governments become unsustainable (Njuguna, 2016). Studies conducted by various scholars depict that devolution of government functions affects economic development. Sepulveda and Martinez-Vazquez (2011) note that devolution of government functions may result in increased poverty head-count ratio and the gap of poverty in a country. However, it might also lead to reduced income disparity in a situation where government represents at least 20% share of economy. However, this study did not assess economic development with focus on human poverty index (Sepulveda and Martinez-Vazquez, 2011). In Mamelodi, South Africa, it was found out that decentralization effectively promotes local economic

development. However, this study did not assess economic development with focus on human poverty index and was not conducted in Kenya(Edoun&Jahed, 2009). It is evident from the review of literature pertinent to the study that little has been done to adequately address the effect of devolution on economic development. Instead the studies focused on economic growth which is also an integral component of economic development as a whole; not on welfare aspects of economic development. Furthermore, no study was conducted on the effect of devolved system of governance on economic development in Kenya, with focus on economic development in terms of human poverty index. Therefore, this study determined the effect of devolved system of governance on economic development in Bungoma County, Kenya.

1.3 Objectives of the Study

The study was guided by the following objectives;

1.3.1 General Objective of the Study

The general objective of the studywas to determine the effect of devolution of government functions on economic development in Bungoma County, Kenya.

1.3.2 The Specific Objectives

The specific objectives are:

i. To determine the effect of devolution of agriculture function on economic development in Bungoma County, Kenya.

ii. To establish the effect of devolution of education function on economic development in Bungoma County, Kenya.

iii. To investigate the effect of devolution of health function on economic development in Bungoma County, Kenya.

iv. To determine the effect of devolution of trade function on economic development in Bungoma County, Kenya.

v. To establish the effect of devolution of transport function on economic development in Bungoma County, Kenya.

vi. To establish the effect of devolution of water function on economic development in Bungoma County, Kenya.

1.4 Research Hypotheses

The following null hypotheses were tested:

H_{O1}: Devolution of agriculture function has no significant effect on economic development in Bungoma County, Kenya.

H_{O2}: Devolution of education function has no significant effect on economic development in Bungoma County, Kenya.

H_{O3}: Devolution of health function has no significant effect on economic development in Bungoma County, Kenya.

H_{O4}: Devolution of trade function has no significant effect on economic development in Bungoma County, Kenya.

H_{O5}: Devolution of transport function has no significant effect on economic development in Bungoma County, Kenya.

H_{O6}: Devolutionof water function has no significant effect on economic development in Bungoma County, Kenya.

1.5Significance of the Study

The study determined the effect of various county government functions on economic development. This will assist the policy makers to have an empirical basis for allocatingpublic resources in the current era of devolution in Kenya. The masses need to be educated on deciding on what to devote their share of the national allocation prudently in order to have accelerated development. The study has contributed to knowledge which is relevant to academicians, researchers and the public at large by empirically determining the effect of devolution of government functions on economic development in Bungoma county, Kenya.

1.6 Scope of the Study

The study was undertakenin Bungoma county, Kenya. The county has 9 sub-counties. The aspects of devolution of government functions focused on were;devolution of agriculture function, devolution of education function, devolution of health function, devolution of trade function, devolution of transport function and devolution of water function.The study used data from the 9 sub counties from 2013 to 2018. The study was completed within a period of 6 months.

1.7Limitations of the Study

The officers in the various departments of the county government of Bungoma were at times busy and thus the required information could not be provided on time as was expected. The researcher had to schedule for appropriate time to get data from the relevant officers based on mutual agreement.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview of the Chapter

This chapter reviews concepts on devolved system of governance, theories guiding the study, empirical literature review, critique of reviewed literature, summary ofreviewed literatureand the conceptual framework for variables under study.

2.1 Concepts on Devolved System of Governance

In the United Kingdom (UK), devolving government functions has led to improvements in health of the public and the policies pertaining to education and has also promoted equality. The devolved units in the UK have limited powers to raise revenue independently (MacKinnon, 2013). The UK scenario is different from other cases of devolution where both national and sub-national devolved units are responsible for collecting and distributing revenue (MacKinnon, 2013). This system of devolution in the UK could negatively affect the performance of devolved units due to the insurbodination of these units in terms of financial independence (MacKinnon, 2013). Acccording to a study conducted in Italy by Calamai (2009), devolution may result in increased regional inequality in terms of spending for the public and outcomes in the economy.

Sepulveda and Martinez-Vazquez (2011) theoretically investigated the ways through which decentralizing fiscal operations affects poverty and inequalities in income distribution among citizens in countries that are developed and those that are still developing. It was noted that decentralization leads to escalation in the poverty head-

count ratio and the gap of poverty in a country. However, inequalities in income may reduce in case the general government is significant in the economy; a share of at least 20% (Sepulveda & Martinez-Vazquez, 2010). According to the World Bank (2013), the availability of infrastructures has significant effect on people's life quality in a given environment. Furthermore, the provision of infrastructure in their right quantity and quality is a key determinant of a country's success or failure in reduction of poverty (World Bank, 2013).

Devolution positively impacts education in a country. According to Faguet (2004) decentralization makes investment of the public in education as well as other services more responsive to the needs of locals in Bolivia. Simatupang (2009) and Qibthiyyah (2008) established that decentralization improves education outcomes such as literacy rates, number of years that citizens school and rates of dropout among primary and secondary school students in Indonesia. Faguet and Sanchez (2006) noted that enrolment in public schools improves as a result of decentralization in Colombia. Barankay and Lockwood (2007) noted that in Switzerland greater decentralization levels lead to better achievements in education. According to Pena (2007), decentralization leads to improved efficiency of government, hence contributing to improved success of students in Spain.

There has been an increase in satisfaction of citizens with delivery of government services by decentralized units based on several surveys conducted on households in European countries (Diaz-Serrano & Rodriguez-Pose, 2015). Decentralizing government

functions leads to improved trust of citizens in institutions related to the government in countries which are members of OECD (Ligthart& van Oudheusden, 2015). Bjornsko, Dreher and Fischer (2008) established that at times local autonomy may not lead to increased happiness among individuals and may sometimes be detrimental, based on a study conducted in 66 countries. However,Sacchi and Salotti (2014) found out that decentralizing tax administration results in increased inequalities in income in 23 OECD countries.

The African decentralization wave began in late 1980s and early 1990s, usually as part of reforms in the public in connection with programmes for structural adjustment. Kenya is among the first countries in Africa to embrace decentralization (Cabral, 2011). However, as noted by Robinson (2007), decentralization reforms in Africa have met several challenges, usually because of lack of a political process that is meaninful, resources being over-centralised, the base for local revenue being weak, inadequate capacity for planning, and limited regulatory changes. According to Conyers (2007) decentralization has not yet been tried fairly in Africa, with only afew countries in Africa having trully devolved power and national resources to established local governments. Governance problems like lack of accountability mechanisms, poor state administrative capacity and weak civil society are some of the challenges affecting decentralization of governance in Africa (Conyers, 2007).

Decentralization is very fundamental in local economic development (LED) promotion in Ghanaian districts. Local governments support development of local economies by

planning for municipalities and implementing development programs, providing infrastructure, planning for use of land and permitting physical development, providing extension services, training and provision of skills to the citizens (Oduro-Ofori, 2016). According to Mehrotra (2006), decentralising of the function of primary healthcare to committees of health that are locally elected results in increased accessibility to affordable health care services in Benin, Guinea and Mali governments. This has led to improvement in the rates of immunization and infant mortalities. The impact of decentralization depends on the nature of the process and is positively related to de facto transfer of power and national resources to the local government (Mehrotra, 2006). Edoun and Jahed (2009) found out that decentralizing government functions and participation of citizens of Mamelodi, South Africa, in governance leads to improved development of local economies through Multipurpose Community Centres (MPCC).

Perceptions on how devolution of health functions affects access to maternal health services in referral hospitals in Western Kenya generally differ. While workers in the health ministry and other health service providers are seemingly discontented with devolved health services, users of maternal services in referral hospitals are considerably satisfied (Kilonzo, Kamaara&Magak, 2017). County governments were largely perceived by users to have promoted better access to maternal health care in referral hospitals. Health service users noted that referral services have been sped up, medicines and ambulance services which were not available have been provided, there is increased accessibility to county and referral hospitals due to improved transport and

communication and maternal health services have been made affordable due to free services (Kilonzo, Kamaara&Magak, 2017).

Soila (2015) found out that there is a statistically significant deterioration of various elements of quality health services after devolution in Nakuru County. Devolution in Kenya has led to significant increase in the space for decision making in county governments. In Githunguri constituency, devolution of government functions has had positive effect on economic development as evidenced by improved transportation systems which have resulted in easy access to markets for products, increased access to better healthcare and water and improvement in street lighting (Njuguna, 2016). The devolution of water function in Kenya is expected to result in increasedprovision of water and sanitation services. Such outcomes of devolution are of great benefits to the people (World Bank, 2013).

2.2 Review of Theories

This sectionreviews theories that the study was founded on. These are; the theory of fiscal decentralization, the new growth theory and the theory of balanced growth.

2.2.1 Theory of Fiscal Decentralization

The theorem of fiscal decentralization,advocated for by Oates in 1972,suggests that the welfare of the society can be improved if levelof goods offered to the public by county governments is pareto-efficient rather than providing common consumption levelsas determined by the national government of the country (Oates 1972). The provisions by

county governments benefits the citizens depending on their various preferences for goods that are public and private from various jurisdictions. If county governments choose different mix of goods and different outcomes of tax, this may remedy unfairness createdif decisions were made at the national level. Indeed, Tiebout (1956)postulated that the provision of services to the public by local governments is highly likely preferred by voters when they can choose the constituency to live in.

According to Godfrey (2016), the provisions of the national government is likea monopolist in theprivate sector that denies voters an alternative. This suggests that a population's demographic characteristics can influence the choice ofvoters'on location of houses. For instance, families that have children who still school and have adequate income will locate close to schools that are desirable while pensioners will locate their houses in areas offering services and benefitsthat meet their needs (Godfrey, 2016).Devolution is significant to the citizens and the economy of a country due to fiscal decentralization that results. It aims to provide a method for serving the preferences of the citizens for services in the public sector that is more effective, as well as enhancing electoral accountability (Oates, 1972).

It is implied that devolution of government functions leads to creation of local market for goods and enables the government to meet the demand by locals for public services, hence enhancing efficiency. This is because representatives of the electorate that are elected in the various counties are more answerable and accessible to the people (Godfrey, 2016). The theory of fiscal decentralization (FD) is significant for economic

development in Kenya as taxation and spending powers have been devolved to county governments, as well as political authority to manage essential services (Godfrey, 2016).

2.2.2New Growth Theory

The new growth theory was developedby Romer (1986) and advanced by Lucas (1988) and Aghion and Howitt (1992). The theory explains the poor performance of many states that are less developed despite having implemented policies in line with propositions of theories of the neoclassical era. According to this theory, changes in technology have been unequal and has not beentransmitted exogenously in quite a number of developing nations (World Bank, 2000). Proponents of new growth theorylinked changes in technologyand knowledge production. The emphasis of the theory is that the growth of the economy is the resultof increased returns to knowledge use; not labour and capital. The new growth theory postulates that better ratesof returnexpected in the Solow model arehighly reduced when levels of complementary investment in the education system, physical infrastructure as well as research and development initiativesare lower (Meier, 2000).

The new growth theory hasbeen criticized as it overlooks structures in the society and institutions; despite the fact that it explains divergence in rates of economic growth across countries (Skott& Auerbach, 1995). The theory also has limited applications due to its unrealistic assumptions. For instance, the economy is treated as a single firm where labour and capital reallocation to generate revenue in the midst of structural change in the economy is not permitted. Other incentives for growth of the economy such as good

infrastructure, adequate institutional structures and perfect capital and goods markets lack in countries that are still developing (Cornwall &Cornwall, 1994). The new growth theory promotes government role as well as public policy in investments meant to improve human capital formation. The theory also advocates for private investments by foreign investors in industries that are knowledge-intensive, for example, telecommunications sector and computer software industry (Meier, 2000).

2.2.3 Theory of Balanced Growth

The theory of balanced growth was postulated by Ragnar Nurkse (1959). It highlights narrow market and limited market opportunities as the main impediments to development. Under these conditions, only complementary investments bundle is capable of creating mutual demand. Thus, governments need to plan for investment to achieve balanced growth (Merrifield, 2010). Fernando (2009) supports the theory of balanced growth by indicating that due to low demand for goods, the propensity to invest is low which translates to low capital equipments per capita and for every worker. This eventually results in low productivity and low income, and hence increased poverty levels. This theory is pertinent to this study as it expounds how county governments should make their investment decision for the betterment of the community's well-being(Whitworth & Whitworth, 2010).

2.3Empirical Literature

This section presents a review of relevant literature on the relationship between devolution of government functions andeconomic development.

2.3.1 Devolution of Agriculture Function and Economic Development

Cornell and D'Arcy (2016)noted that the expected benefits of devolution in terms of promoting development is yet to be felt in Kenya. Prospects of local development under devolution depends on degree of patronage, capacity at the local level and clarity in responsibilities and roles between local and national levels. It was therefore revealed that little had been achieved in developing the economy since the onset of devolution.

Omorogiuwa, Zivkovic and Ademoh (2014) noted that a return to an agricultural economy greatly benefits the entire country of Nigeria. It was established that adequate finances are required to ensure proper running of agriculture in Nigeria. The study established that diversification into agriculture leads to self sustainability and economic empowerment.Greyling (2012) examined the role that agriculture plays inSouth Africa's economy. The study established that since 2000, the domestic demand for main food requirements has not been met by the agricultural sector. The study found out that exports in agricultural sector do not lead to growth, but promotes balanced development in the country's economy.Results of analysis revealed thatin 2010, the agricultural sectorand other strong-linkage sectors represented a share of about7% of the economy.

Malikov, Qineti, Pulatov and Shukurov (2016)determined that economic growth has a positive connection with agricultural growth in Uzbekistan. It was established that agriculture has a big contribution to income creation in Uzbekistan. The study results revealed that agricultural production was more sustainable than the economy in general in Uzbekistan. It was noted that during the study period, the number of agriculture

employeeswas rising quickly, though the growth rate of labor force in agriculture was still unsustainable.

Diao, Hazell and Thurlow (2010) examined the effect of agriculturein Africa's economic development. Countries involved in the study were; Ethiopia, Ghana, Kenya, Uganda and Zambia.It was noted that although Africa facesseveral new challenges which are different from those faced by countries in Asia, there is little chance of convincing one thatthese countries will experience agricultural revolution totransformtheir economies successfully.Results of analysis showed that growth in agriculture, in comparison with industrial growth, has greater benefits in developing the economy.

Diao (2010) studied the economic significance of agriculture in enhancing sustainable development and reduction of povertyin Ghana.It was noted that development in agriculture that is broad-based in Ghana is very fundamental in improving people's income and the economy hence leading to beneficial transformation. It was determined that growth in agriculture playsa key role in poverty reduction. It was noted that production of crops is an important activity for income generation in most households in rural areas. The poor place much reliance on crop farming than the non-poor.

Matthew and Mordecai (2016) analysedNigeria's agricultural sector output and development. Results of variance decomposition analysisshowed apart from feedback shocks, agricultural shocks have a greater contribution to economic development shocks in the country. The impulse response function results revealed that income per capita

responds positively to agricultural output shocks. It was noted that agriculture plays a critical role in developing Nigeria's economy. Enu (2014) analysed the economic impact that the agriculture has on growth of Ghanaian economy using time series data from 1996 to 2006. The study found out that output in agriculture positivelyand significantlyimpacts growth of Ghana's economy in comparison to service and industrial sectors.

Odetola and Etumnu (2013)established that agriculture has a consistent positive effect on Nigerian economy's growth. Results of analysis using causality tests revealed that growth in agriculture Granger-causes, with no reverse relationship, growth in GDP. The study determined that the economic sector of agriculture is resilient as it recoversfaster than the other sectors from shocks which result from events that disrupt the economy such as the civil war of 1967 to 1970 and the recession of the economy that occurred from 1981 to 1985.

Kannan (2013) examined whether decentralization improve agricultural services delivery in Karnataka state, India.The study noted that there is improvement in public agricultural service provision tocitizens due to implementation of devolved structure of governance. It was noted that the manner in which devolved governance structures are set affects the attainment of economic development outcomes.

2.3.2 Devolutionof Education Function and Economic Development

Sentao Consulting (2017) studied ECDE service delivery in Kenya's Kilifi County. The study revealed that prior to devolution, ECDE was a neglected sector characterized by; lack of facilities, lack of teachers, the few teachers that existed were largely inadequately trained (majority were standard 8 drop outs), unfair distribution of ECDE centres among others. It was noted that in the pre-devolution era, ECDE was only a preserve of the rich since they were largely run by private investors and it is only the rich who could afford to take their children to private ECDEs. However, this changed with the advent of the new dispensation as the county shifted focus to prioritizing investment in public ECDE sector.It was noted that education is critical in poverty alleviation and developing the economy. With devolution, the local community stands a chance of benefiting from the devolved resources besides increased citizen participation in identification of priorities and local governance.

Khaunya, Wawire and Chepng'eno (2015) studied devolution and economic development in Kenya. The research methodology was based on review of literature, case studies and analysing sources of information. It was noted that the devolution of government functions has resulted in increased accountability on economic development matters. It was established that the devolved system of governance may not solve the problem of unequal distribution of resources among counties. It was noted that there is need for resource and capacity development in the counties so as to realize economic development in the long run.

Chatterji (2008) examined education anddevelopment of India's economy.The study determined that the role of education and educational policies in enhancing economic development is greater once economic development is viewed from broader perspective. The study found out that government investment in education has little benefit among backward castes, as education is unable to guarantee superior jobs. Study results indicate that if material assets are not substantially redistributed in the society, focusing alone on development of education won't be fully successful in enhancing socio-economic welfare of groups that are surbordinate in society. It was found out that though primary education offers private rates of return that are relatively low, its significance in enhancing economic development is monumental.

Gyimah-Brempong (2010) analysedthe effect of education on economic development in 52 African countries.Panel data from two new data sets on educational achievement was used to examine the effect of education outcomes on economic development. It was noted that impact of education on growth of income, health of citizens, participation of females in the political arena, and political stability in Africais positive and significant. It was also established thatvarious education levels differently affectoutcomes of development.For some development outcomes, education at primary and secondary levelscan be more important in comparison with education at tertiary level while for other outcomes of development, such as rate of growth of income, education at tertiary level may be more significant.

Tansel and Gungor (2012) assessed the gender effects of education on the development of Turkey's economy.It was found out that educating femalesaffects the steady-state labor productivity level positively and significantly, while education of males can bepositive or insignificant. It was noted that gap of gender in education negatively affects output.The International Institute for Applied Systems Analysis (2008) examined the role that education plays in developing countries' economicgrowth using the cases of Ethiopia, Kenya and Nigeria.It was noted that economic development in a country significantly relies on the education of the citizens. It was determined that better education results in higher income of individuals and is necessary, though at times insufficient, precondition forlong term economic growth.It was established that economic development is boosted by investment in education at secondary level more than universal education at primary level.

Omondi (2016) examined the effects of education ongrowth of Kenya's economy. The study findingsrevealed that there exists a significant favorable connection between growth of realGDPand education levels. The co-efficients of regression for educational levels were all positive showing that increases in these variables will result into increases in real GDP growth rate.

2.3.3 Devolutionof Health Function and Economic Development

Okech (2017) examined the effect of devolved services of public health on access to healthcare in Kenya. The study noted that the government is committed in promoting increased access to healthcare by the citizens. This is evidenced by efforts to increase

human, physical and financial resources meant for health care service provision, though there is evidence of poor planning and coordination.It was found out that despite the efforts to devolve the health function, there is still disparity in provision of healthcare services as evidenced by health infrastructure that is inadequate, plans for investment that are not comprehensive, inadequate drugs, inadequate skilled personnel and weak emphasis on health care financing. It was noted that in the era of devolved health function, there is still disparity in provision of health services across the country.

Stevens, Linthicum and Bhattacharjya (2015) examined the impact of health on development.Study results revealed that health and wealth are strongly and positively associated.The improvement of health positively and significantly impacts onwelfare of individuals, income and productivity as well as financial security.It was noted that the higher the rise in health-adjusted life expectancy, the more impressive is the growth of the economy; dependingon whether a suitable economic and social environment exists or not. Weil (2013) studied the role of health in economic growth. It was noted that income and health are strongly correlated. It was noted that income per capita is positively related with life expectancy across countries. The study established that within countries, the correlation between the place of an individual in the distribution of income and the outcomes of health is strong, especially in countries that are still developing.

Finlay (2007) examined the role that health plays in developing the economy by focusing on productivity effect of direct labour and the incentive that is indirect. It was

noted that while education drives the growth of the economy, health plays a role that is indirect. It was determined that health positively and significantly affects, indirectly, the growth of the economy.It was established that underestimation of economic benefits of improvements in health would occur if the indirect role of health is not recognized.Strittmatter and Sunde (2011) examined the effect of health ondevelopment of Europe's economy and established that introducingsystems of health care to the public significantly and immediately affects the infant mortality dynamics and crudemortality rates. It was revealed that reduction in rates of infant mortality or crude death ratespositively affectsdevelopment of the economy.

Babatunde (2012)established that health, measured by life expectancy, positively and significantly affects the growth of the Nigerian economyeven with initial levels of income as control variables. It was noted thatexpenditure in health significantly affects economy's growth; which could be due to small share of health expenditure in government's total expenditure.

2.3.4 Devolutionof Trade Function and Economic Development

Hussain and Haque (2016) revealed that the rate of growth of per capita gross domestic product is associated withtrade in Bangladesh. The results analysis using vector error correction model (VECM) revealed that the variables are related in the long term. It was noted that trade significantlyaffects the rate of growth of per capita GDP.Fitzova and Zídek(2015) examined the impact that trade has on economic growth in the Republics of Czech and Slovak.Results of econometric analysis revealed that there is a long-term

equilibrium between trade and the growth of GDP. The study established that export trade plays a fundamental rolein growth of the economies of the two countries; which is export-led.

Adeleye, Adeteye and Adewuyi (2015) noted that international trade affects the growth of Nigerian economy; but out of all variables used as proxies to trade at the international level, it is only total exports that positively and significantly affects the growth of the economy. It was noted that import trade negatively impacts on the economy. It was establishedthat exportation of oil cannot shield the negative effect of import trade on the economy effectively.Sun and Heshmati (2010) noted thatinternational trade in China had expanded leading to dramatic growth of the economy hence leading to target market expansion across the globe. It was established that the volume of international trade and the structure of trade towards exportation of high-technologyproducts enhances the regional productivity of China.

Busse and Koniger (2012) analysedthe effect that trade has on the growth of the economy by re-examining empirical evidence.It was noted that evidence in empirical research on a causal linkage between trade and economic growth is ambiguous, though integration of trade is usually seen as a major determinant of the growth of the economy.The study argued that the effect that trade has on economic growth based on panel estimations that are dynamic depends on trade specification.It was determined that trade positively and significantly impacts on growth of the economy.It was noted that

trade is effective in improving the growth of the economy in countries that are developing.

2.3.5 Devolutionof Transport Function and Economic Development

Sartori and Catalano (2013) noted that the effects on wellbeing of citizens vary to a high extent in various projects. It was established that satisfaction or dissatisfaction sociallycan occur based on expectations in which case, the positive or negative effects will be of high magnitude. It was noted the effects are less intense when social satisfaction or dissatisfactionrelates to factors that are objective. It was determined that magnification of effects occurs when measures that are specific are used to change the perception of projects by the citizens.

Alder (2014) examined the effect that transport infrastructure has on the development of the economy in India.It was noted that investments in highways leads to positive net benefits on aggregate, but it is not equal in all districts.Furthermore, it was established that significant effects of distribution are also experienced as regions that had less development initially benefit from such networks which lead to integration of regions of intermediate density. Ismail and Mahyideen (2015) studied the impact that infrastructure has on trade and growth of economies of selected countries inAsia.It was noted that improving transport leads to enhancement of trade flows which in turn improves the growth of the economy. This is because it creates an avenue through which full potential for growth of an economy is exploited. Quality infrastructure also leads to production of output that is efficient and productive.

Kayode, Onakoya, Babatunde and Abiodun (2013) established that transportation plays a positive andinsignificant role in determining the growth of the economy of Nigeria.Nazemzadeh, Meersman and Vanelslander (2015) examined the contribution of transport to economic development in Antwerp.The results revealed that the economy's openness ratio positively and significantly impactson Belgian economic growth. It was also established that transport infrastructure that is productive facilitates development of businesses, reduces prices of products, provides access to suppliers and markets for consumers in the global arena, and creates a process of production in the global arena that is more cost effective as it lowers costs of transport and increases accessibility.

2.3.6 Devolutionof Water Function and Economic Development

Tir, Momeni and Boboevich (2014) explored the effects that investment in the sector of water has on the development of Iranian economy.It was established thatinvestment in water in the agricultural sector is significantly and positively elastic at 0.02%, though negative and non-significant for other sectors, at 66% confidence coefficient.Fogden (2009) examined the impact that access to drinking water that is safe has on growth of the global economy.It was noted that the growth of the economy depends on level of access to drinking water that is safe. It was established that there is a decline in quality of drinking water around the globe, leading to higher burden of diseases, lower levels of education, lower productivity of workers, higher cost of labor and slower growth of world economies.

Musouwir(2010) examined the correlation that exists between investment in the water sector and growth of economies of 22 developing African countries.It was noted that the relationship between deviation of rain from the mean and per capita GDP is not significant statistically. The results of analysis indicated that the relationship between national budget on sanitation and supply of water per capita GDP as well as between Official Development Assistance (ODA) in all sectors and per capita GDP is statistically significant.

Manase (2009) established thatinvestment in water infrastructure is critical in building the economy and reducing vulnerability at the macroeconomic level in South Africa.This paper noted that a strong correlation exists betweenwater and the economy highlighting the impact of floods and droughts in other South African Development Community (SADC) countries. It was noted that investing in water infrastructure, management and services is absolutely essentialand is a prerequisite that is necessary for sustainable growth of the economy, poverty alleviation and development of the society.

Blignaut and Van Heerden (2009) examined the impact that scarcity of water has on initiatives of developing South African economy. A macro-economic model was used and it was established that if any industry is stimulated, the demand for water which is an input in the process of production increases. It was revealed that planning at the macro-economic level and designing of the strategies for the development of the economy cannot be done without due consideration of constraints of natural resources.

2.4Critique of the Reviewed Literature

A review of empirical literature pertinent to the studyrevealed that little has been done to adequately address the effect of devolution on economic development. No study reviewed looked at particular functions played by devolved governments on the socio-economic welfare of people as a measure of economic development. Instead the studies concentrated on economic growth which is also an integral component of economic development as a whole. Therefore, the studies did not look into the effect of devolved government functions on welfare aspects of economic development. The studies actually did not focus particularly on political decentralization/devolution in Kenya and its effects on development of the economy. Therefore, there is a pertinent gap filled by this study on the effect of devolution of government functions on economic development in Kenya.

2.5 Summary of the Reviewed Literature

The fiscal decentralization theorem of Oates (1972) suggests that the welfare of the society can be improved if level of goods offered to the public by county governments is pareto-efficient instead of providing common consumption levels as determined by the national government of the country (Oates 1972). It is implied that devolution of government functions leads to creation of local market for goods of the public and enables the government to meet the demand by locals for public services hence enhancing efficiency. The theory of balanced growth highlights narrow market and limited market opportunities as the main impediments to development. It was

established that under these conditions, only complementary investments bundle is capable of creating mutual demand. Thus, governments need to plan for investment to achieve balanced growth. The new growth theory emphasizes that the growth of the economy is the result of increased returns to knowledge use; not labour and capital. The new growth theory postulates that better rates of return expected in the Solow model are highly reduced when levels of complementary investment in the education system, physical infrastructure as well as research and development initiatives are lower.

It was found out that agricultural exports bringsa balancing role in economic development. It was found out that economic growth has a positive connection with agricultural growth. It was also established that agriculture has a big contribution to income creation and poverty reduction. It was established thatdiversification into the agricultural market enhances self sustainability and economic power.It was noted that education positively and significantly impacts on the growth of income, health, political participation among females, and stability of the African political environment.It was established that introducing systems of public health care significantly and immediately affects the dynamics of rates of crude deaths and infants mortality, hencepositively affecting income per capita growthand increasing the growth of population. It was revealed that health and wealth are strongly and positively related. It was determined that there is a large, positive and significant impact from good or improved health on individual welfare, income, productivity and financial security.

It was established that export trade positively and significantly affects growth of the economy. However, it was noted that import trade offers a negative impact on the economy. It was determined that the effect of trade on the growth of the economy depends on trade specifications. It was noted that the positive influence of trade on income growth is not in alldeveloping countries.It was determined that the openness ratio of economy positively and significantly impacts on the growth of the economy.It was also established that transport infrastructure which is productive enhances development of businesses, leads to reduction in prices of products, provides access to suppliers and markets for consumers at the global level, and create more cost effective global production process by lowering transport costs and increased accessibility.

It was noted that access to drinking water that is safe enhances economic growth. It was established that decline in quality of water meant for drinkingacross the globe leads to a higher burden of diseases, lower levels of education, lower productivity of workers, higher cost of labor and slower growth of the economy. It was revealed that there is a strong correlation between water and the economy highlighting the impact of floods and droughts in other SADC countries. It was noted that investing in water infrastructure, management and services is absolutely essential and is a prerequisite that is necessary in sustaining the growth of the economy, alleviating poverty and developing the society.

2.6Conceptual Framework

Mugenda (2008) defines the conceptual framework as a brief description of study phenomenon assisted by graphical description of variables being studied, that is, the

dependent and independent variables.Mugenda (2008) defines the independent variable or predictor variableas the variable that predicts the variation in another variable (dependent variable) while dependent or criterion variable, is defined as a variable thatanother variable influences or changes. The interaction of the main determinants of the study aresummarized in Figure 2.1.

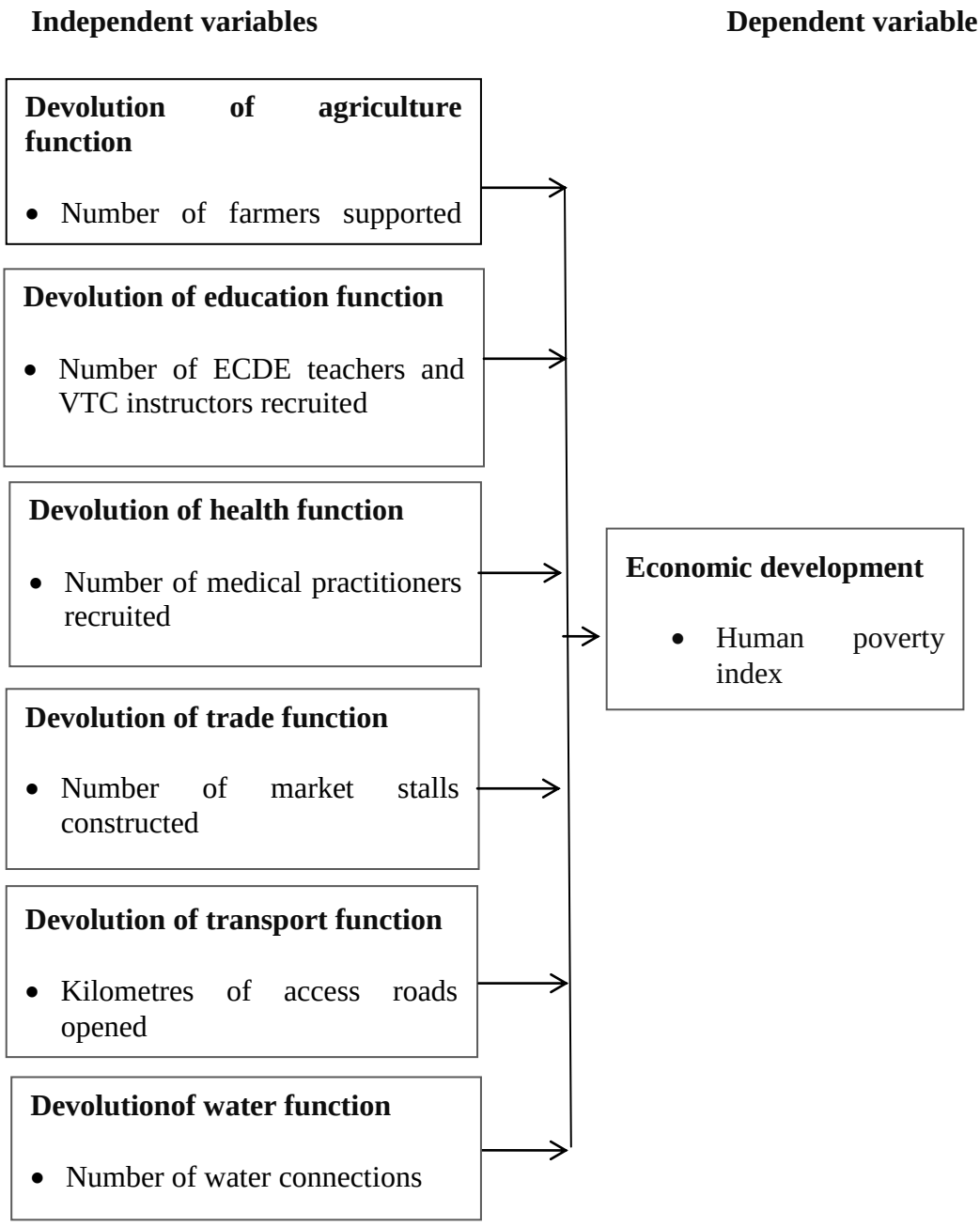

Figure 2.1: Conceptual Framework

Source: Author, 2020

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Overview of the Chapter

This chapter presents discussions on step by step procedures that were followed in addressing the research problem. This chapter outlines the design that the study used, the population, the technique employed to collect data, the procedures for collection of research data and the techniques of descriptive and inferential analysis of panel data.

3.1 Research Design

According to Saunders, Lewis and Thornhill (2009), the research design refers to the framework for solving the research problem under examination. Thisstudy employed explanatory research design. The explanatory research design is used to explain relationships that exist between variables in a study (Saunders, Lewis & Thornhill, 2009).

3.2 Population of the Study

According to Ogula (2010), population of the study refers to the elements or units or subjects that the study is investigating. It is from the population that appropriate information is sought in order to provide answers to various questions that the researcher has posed. Target population refers to the specific population that the researcher desires to get information about. The study population is accessible or within the reach of the researcher (Mugenda & Mugenda, 2008).The study populationwas the 9 sub counties in

Bungoma county. The study period was between 2013 to 2018, thus giving a total of 54 observations.

3.3 Data Collection Instruments

According to Saunders, Lewis and Thornhill (2009), the chosen data collection methods ought to be very accurate and convenient to obtain data from studyrespondents. The study used secondary panel data which was obtained from the county government of Bungoma. Secondary data sheets were used to collect secondary dataon human poverty index, number of farmers supported per year, number of ECDE teachers and VTC instructors recruited, number of medical practitioners recruited, number of stalls constructed, kilometres of access roads opened and number of water connections from 2013 to 2018.

3.4 Data Collection Procedures

Consent from Moi University and research permit from National Commission for Science, Technology and Innovation (NACOSTI) was obtained before going to collect data for the study. The data was then obtained from the county government statistics department after stipulated time as was agreed with them as most of the officers were very busy. Follow ups were made so that delays in data provision could not hinder efficient and effective data collection.

3.5 Data Processing and Analysis

Data was analysed both descriptively and inferentially. Descriptive statisticsincluded sum, minimum, maximum, percentages, means, standard deviations and trend analysis. Inferential statistical tools included panel covariance analysis, panel correlation analysis, panel cross-section dependence analysis, panel causality analysis, panel cointegration analysis and multiple regression analysis. Tables and graphs were used for data presentation.

3.5.1 Model Specification

The following multiple regression model was adopted for the study:

$$\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon}\text{.....Equation 3.1}$$

Where; **Y** represents economic development in Bungoma County, Kenya.

$\boldsymbol{\beta_0}$represents the y-intercept

$\boldsymbol{\beta_1}$, $\boldsymbol{\beta_2}$, $\boldsymbol{\beta_3}$, $\boldsymbol{\beta_4}$, $\boldsymbol{\beta_5}$ **and** $\boldsymbol{\beta_6}$represent coefficients of devolution of agriculture function, devolution of education function, devolution of health function, devolution of trade function, devolution of transport functionand devolution of water function respectively

$\mathbf{X_1}$, $\mathbf{X_2}$, $\mathbf{X_3}$, $\mathbf{X_4}$, $\mathbf{X_5}$**and** $\mathbf{X_6}$ represent the independent variables

$\boldsymbol{\varepsilon}$ represent error term

The devolution of agriculture function was measured by number of farmers supported per year (FARM). The devolution of education function was measured by number of

ECDE teachers and VTC instructors recruited (INSTR). The devolution of health function was measured by number of medical practitioners recruited (MED). The devolution of trade function was measured by number of stalls constructed (STALL). The devolution of roads function was measured by kilometres of access roads opened (ACCESS). The devolution of water function was measured by number of water connections (CONN).

Human poverty index was measured by human poverty index for developing countries ($HPI\text{-}_1$). The HPI was developed by United Nations (UN) as an indicator of a country's living standard and was first used in reporting about the development of humans in 1997. It is complementary to the human development index (HDI) (Chakravarty &Majumde, 2005).In comparison to HDI, HPI is better in measuring the extent to which developing countries experience deprivation of basic requirements for good living. It is appropriate measure because at any given time, it is not possible that there is absolutely no poverty in a country.The HPI is an indicator of the extent to which people are deprived of long life, knowledge and good living standard (Chakravarty &Majumde, 2005). There exists HPI for countries that are still developing ($HPI\text{-}_1$) and countries with high income in the OECD ($HPI\text{-}_2$). The advantage of the existence of the different measures is that it assists in assessing differences between developing and high-income countries socio-economically (Chakravarty &Majumde, 2005). The HPI_1 formula adopted by the study is calculated as shown in Equation 3.2.

$$\mathbf{HPI-1} = [\tfrac{\mathbf{1}}{\mathbf{3}}(\boldsymbol{P_1^{\alpha}} + \boldsymbol{P_2^{\alpha}} + \boldsymbol{P_3^{\alpha}})]^{\mathbf{1/\alpha}} \quad \textbf{.....Equation 3.2}$$

In Equation 3.2, P_1 represents probability at birth of not surviving to age 40 (times 100), P_2represents illiteracy rate, P_3represents unweighted average of population without sustainable access to an improved water source and children under weight for age and αrepresents 3.The study therefore used Equation 3.3 to estimated the regression model parameters:

HPI = C(1)*FARM + C(2)*INSTR + C(3)*MED + C(4)*STALL + C(5)*ACCESS + C(6)*CONNS.....Equation 3.3

3.5.2 Assumptions of Multiple Regression Model

Multiple regression model assumptions are linearity, homoscedasticity, normality, multicollinearity and independence of residuals. In multiple regression, it is assumed that the relationship between dependent and predictor variables is linear. Violation of linearity assumption implies that there may be in the regression estimates such as coefficients of regression and statistical significance tests; hence the true values of the population will not be reproduced(Keith, 2006). Residual plots showing the residuals that are standardized against the values that are predicted were used to test if the assumption of linearity is met. The expectation when this assumption is met is that residuals would be randomly scattered about the line that is horizontal in the plot of residuals, with no pattern that is visible(Stevens, 2009).

Homoscedasticity is normally assumed in regression analysis, meaning that error variances are equal for all independent variables' levels. This is confirmed when variance of errors around the line of regressionis equal for all independent variables'

values(Keith, 2006). In case the variance of errors are not equal for all predictor variables' values, findings will be distorted and analysis' statistical power will be weakened hence enhancing chances of Type I error, inconsistent results of F-test and conclusions that are erroneous. Residual plots wereused to check if the homoscedasticity assumption of regression analysis is met. A patternless plot of residuals indicates that this assumption is met (Antonakis& Dietz, 2011).

In multiple regression analysis, it is assumed that there is no multicollinearity meaning that predictor variables are notcorrelated. The implication of meeting this assumption is that reliable inference on variable effects will be made. If this assumption is violated, results which are not usual and mislead will be noted, standard errors will be inflated and power of the coefficients of regression will be reduced making it necessary to increase sample sizes (Keith, 2006). Separation of variable effects is more difficult with increased correlation of variables.This can lead to underestimation of predictors' relevance, hampers testing of hypothesis of effects of interaction and reduces the power of detecting a relationship of moderation between variables(Shieh, 2010). Variance inflation factor (VIF) and tolerance were used to test for multicollinearity. VIF is usually larger than ten when serious multicollinearity problems exist(Keith, 2006; Shieh, 2010).

In the multiple regression model, it is assumed that the distribution of errors is normal. This implies that residual value plots will be approximately normal curves. The shape of the curve determines the values that the researcher will expect from regression analysis(Keith, 2006). If the distribution of errors is not normal, relationships between

variables and tests of significance will be distorted. If outliers exist in the research data, the results of multiple regression analysis will not be accurate. Outliers can influence both Type I and Type II errors and the overall accuracy of results. Normality was tested using the Jarque-Bera statistic (Stevens, 2009).

In regression analysis, it is assumed that errors are not dependent on one another. The implication of this assumption is that responses from subjects of the study are independent(Stevens, 2009). The Durbin-Watson coefficient was used to check for violation of this assumption. Violation of this assumption results in inaccurate standard scores and tests of significance. The risks of Type I errors also increase (Keith, 2006; Stevens, 2009). The implication of this assumption being violated is that standard errors can be underestimated and variables can be falsely labeled as significant statistically (Keith, 2006). Examining the variability of the boxplots allows the researcher to explore violations to independence of errors (Keith, 2006). The Durbin-Watson statistic coefficient is usually between 0 and 4. It is 2.00 when there is no autocorrelation among the residuals, gets close to 0 when there is positive autocorrelation. The value of the statistic is beyond 2 when there is negative autocorrelation (Lind, Marchal&Wathen, 2012).

CHAPTER FOUR

RESULTS, INTERPRETATION AND DISCUSSION

4.0 Overview of the Chapter

This chapter deals with the analysis of data. The objective of the study was to determine the effect of devolution of government functions on economic development in Bungoma county, Kenya. The study conducted descriptive analysis,trend analysis and inferential analysis. These results relate to the nine sub-counties in Bungoma county namely; Bumula sub-county, Kabuchai sub-county, Kanduyi sub-county, Kimilili sub-county, Mt. Elgon sub-county, Sirisia sub-county, Tongaren sub-county, Webuye East sub-county and Webuye West sub-county.

4.1 Descriptive Analysis

Descriptive analysis was conducted for devolution of agriculture function, devolution of education function, devolution of health function, devolution of trade function, devolution of transport function, devolution of water function and economic development in Bungoma County, Kenya. The analysis results are discussed and presented in this section.

4.1.1 Descriptive Statistics for the Devolved Functions of County Government

The study established the mean, sum, minimum and maximum of the number of farmers supported per year (FARM), number of ECDE teachers and VTC instructors recruited (INSTR), number of medical practitioners recruited (MED), number of stalls constructed (STALL), kilometres of access roads opened (ACCESS) and number of water

connections (CONN) in the nine sub counties in Bungoma county, Kenya between 2013 and 2018.The study's pertinent analysis results are depicted in Table 4.1.

Table 4.1: Descriptive Statistics for the Devolved Functions of County Government

Descriptive statistics	FARM	INSTR	MED	STALL	ACCESS	CONN
Mean	176.830	394.410	209.330	22.830	143.870	2386.91
Maximum	294.000	755.000	519.000	60.0000	316.000	13931.0
Minimum	102.000	140.000	94.0000	8.00000	15.0000	328.000
Sum	9549.00	21298.00	11304.00	1233.00	7769.000	128893.0
Observations	54	54	54	54	54	54

Source: Author, 2020

The findings indicate that the maximum number of farmers supported per year in the nine sub counties in Bungoma county, Kenya between 2013 and 2018, was 294. The minimum number of farmers supported per yearwas 102. The total number of farmers supported between 2013 and 2018 was 9549.

The findings indicate that the maximum number of ECDE teachers and VTC instructors recruited in the nine sub counties in Bungoma county, Kenya between 2013 and 2018, was 755implying that the highest number of ECDE teachers and VTC instructors recruited as at 2018 was 755. The minimum number of ECDE teachers and VTC instructors recruited was140, implying that the least number of ECDE teachers and VTC instructors recruited as at 2013 was 140. The total number of ECDE teachers and VTC instructors recruited between 2013 and 2018 was 21298.

The findings indicate that the maximum number of medical practitioners recruited in the nine sub counties in Bungoma county, Kenya between 2013 and 2018, was 519implying

that the highest number of medical practitioners recruited as at 2018 was 519. The minimum number of medical practitioners recruited was 94, implying that the least number of medical practitioners recruited as at 2013 was 94. The total number of medical practitioners recruited between 2013 and 2018 was 11304.

The findings indicate that the maximum number of stalls in the nine sub counties in Bungoma county, Kenya between 2013 and 2018, was 60implying that the highest number of stalls as at 2018 was 60. The minimum number of stalls was 8, implying that the least number of stalls as at 2013 was 8. The total number of stalls between 2013 and 2018 was 1233.

The findings indicate that the maximum kilometres of access roads openedin the nine sub counties in Bungoma county, Kenya between 2013 and 2018, was 316implying that the highest kilometres of access roads openedas at 2018 was 316. The minimum kilometres of access roads openedwas 15, implying that the least kilometres of access roads openedas at 2013 was 15. The total kilometres of access roads openedbetween 2013 and 2018 was 7769.

The findings indicate that the maximum number of water connections in the nine sub counties in Bungoma county, Kenya between 2013 and 2018, was 13931implying that the highest number of water connections as at 2018 was 13931. The minimum number of water connections was 328, implying that the least number of water connections as at

2013 was 328. The total number of water connections between 2013 and 2018 was 128893.

4.1.2 Descriptive Statistics for Human poverty index in Bungoma County, Kenya

The study established the mean, standard deviation, minimum and maximum of annualhuman poverty index (HPI)in the nine sub counties in Bungoma county, Kenyabetween 2013 and 2018. The study's pertinent analysis results are depicted in Table 4.2.

Table 4.2: Descriptive Statistics for Human Poverty Index in Bungoma County, Kenya

Descriptive statistics	Human Poverty Index
Mean	0.229944
Maximum	0.261000
Minimum	0.187000
Standard deviation	0.016334
Observations	54

Source: Author, 2020

The findings indicated that the maximum annual human poverty index in the nine sub counties in Bungoma county, Kenya between 2013 and 2018, was 0.261000. The minimum annual human poverty index was 0.187000. On average, it was noted that the annual human poverty index for the 54 observations was 0.229944, with a standard deviation of 0.016334.

4.2 Trend Analysis

Trend analysis was conducted for devolution of agriculture function, devolution of education function, devolution of healthfunction, devolutionof trade function,

devolutionof transport function, devolution of water function and economic development in Bungoma County, Kenya.The analysis results are discussed and presented in this section.

4.2.1 Devolution of Agriculture Function

The study sought to establish the trend in the number of farmers supported per yearin Bungoma county, Kenya. The study's pertinent analysis results are depicted in Figure 4.1.

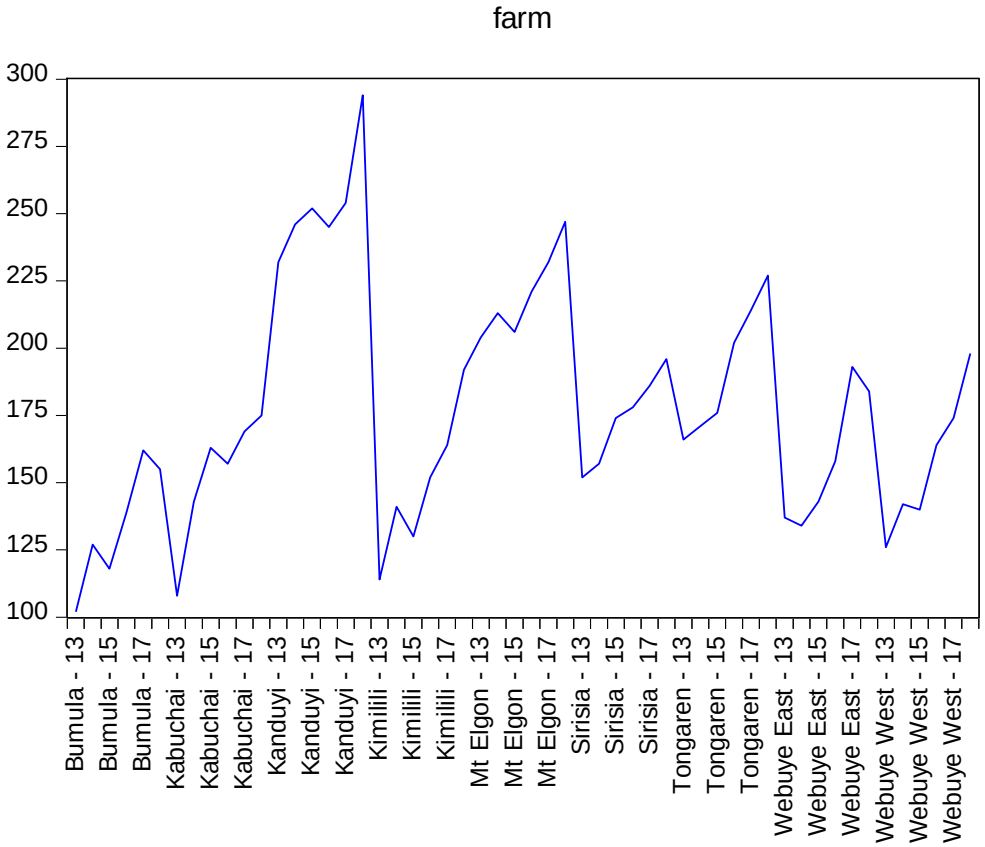

Figure 4.1: Number of Farmers Supported per Year from 2013 to 2018

Source: Author, 2020

The findings indicate that there was a general rise in the number of farmers supported per year in each of the nine sub-counties in Bungoma county between 2013 and 2018. Further analysis on sub-county basis reveals that Kanduyi sub-county had the highest general increasing trend in the number of farmers supported per year followed by Mt. Elgon sub-county, Tongaren sub-county, Kimilili sub-county, Webuye West sub-county, Webuye East sub-county, Sirisia sub-county, Kabuchai sub-county and Bumula sub-county respectively.

4.2.2Devolution of Education Function

The study established the trend in the number of ECDE teachers and VTC instructors recruited in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Figure 4.2.

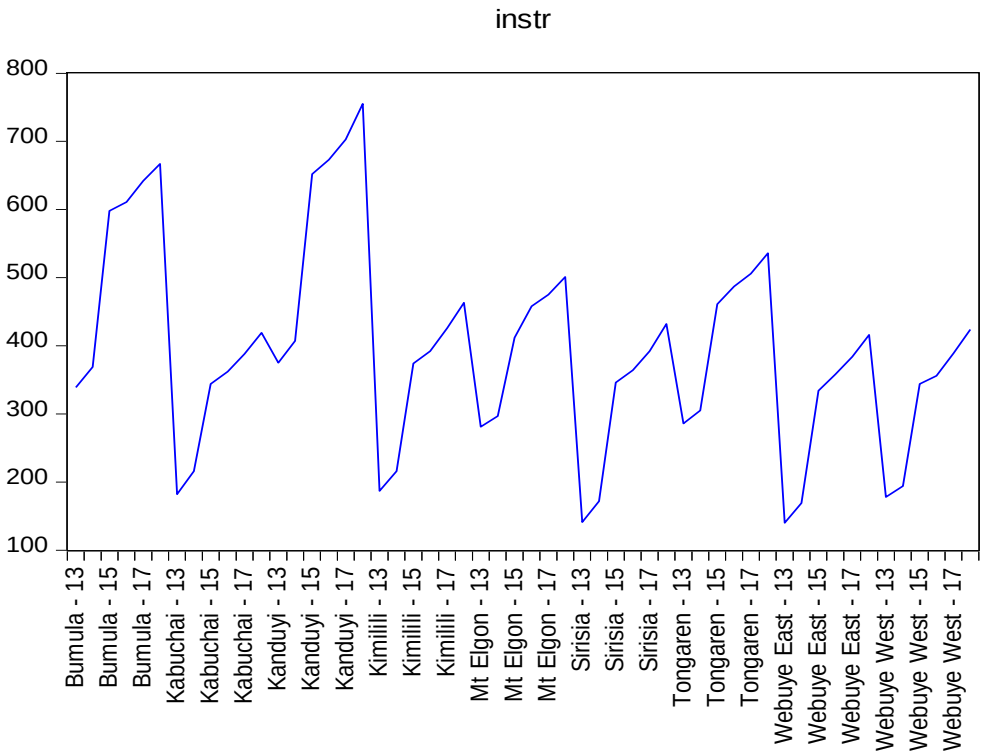

Figure 4.2: Number of ECDE Teachers and VTC Instructors Recruited from 2013 to 2018
Source: Author, 2020

The findings indicate that there was a general rise in the number of ECDE teachers and VTC instructors recruited in each of the nine sub-counties in Bungoma county between 2013 and 2018. One of the reasons is that the figures are cumulative. Further analysis on sub-county basis reveals that Kanduyi sub-countyhad the highest general increasing trend in the number of ECDE teachers and VTC instructors recruited followed by Bumula sub-county,Tongaren sub-county, Mt. Elgon sub-county, Kimilili sub-county, Webuye West sub-county, Sirisia sub-county, Webuye East sub-countyandKabuchai sub-county respectively.

4.2.3 Devolution of Health Function

The study sought to establish the trend in the number of medical practitioners recruited in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Figure 4.3.

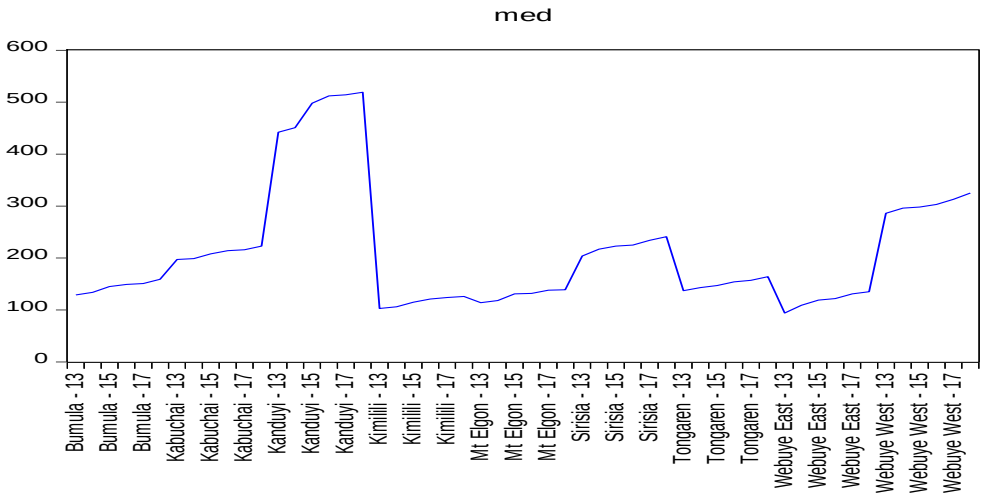

Figure 4.3: Number of Medical Practitioners Recruited from 2013 to 2018
Source: Author, 2020

The findings indicate that there was a general rise in the number of medical practitioners recruitedin each of the nine sub-counties in Bungoma county between 2013 and 2018. One of the reasons is that the figures are cumulative. Further analysis on sub-county basis reveals that Kanduyi sub-county had the highest general increasing trend in the number of medical practitioners recruitedfollowed by Webuye West sub-county, Sirisia sub-county, Kabuchai sub-county, Bumula sub-county, Tongaren sub-county, Mt. Elgon sub-county, Webuye East sub-county andKimilili sub-county respectively.

4.2.4Devolutionof Trade Function

The study sought to establish the trend in the number of stalls in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Figure 4.4.

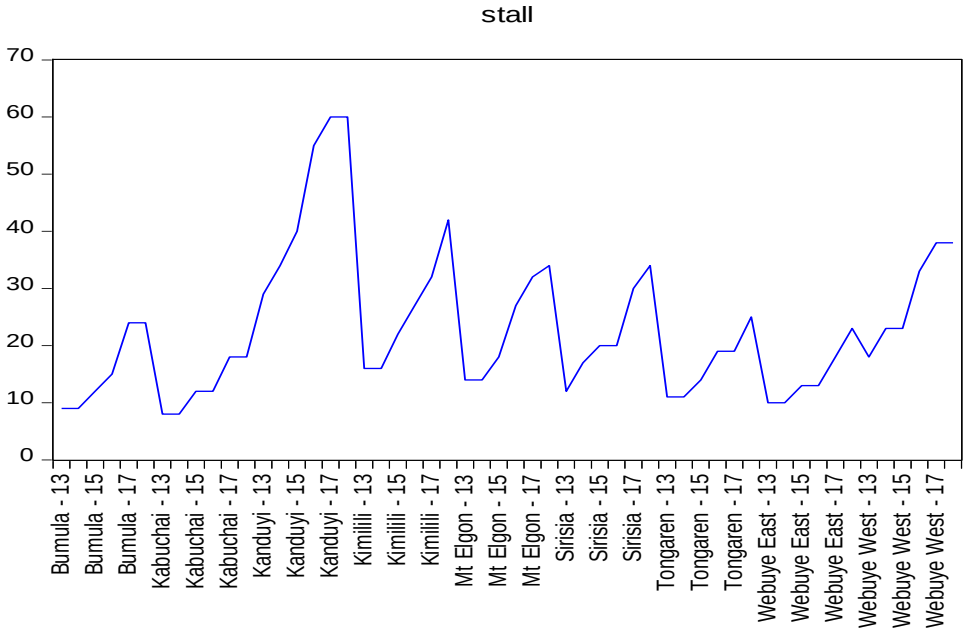

Figure 4.4: Number of Stalls from 2013 to 2018

Source: Author, 2020

The findings indicate that there was a general rise in the number of stalls in each of the nine sub-counties in Bungoma county between 2013 and 2018. One of the reasons is that the figures are cumulative. Further analysis on sub-county basis reveals that Kanduyi sub-county had the highest general increasing trend in the number of stalls followed by Kimilili sub-county, Webuye West sub-county, Sirisia sub-county, Mt. Elgon sub-county, Tongaren sub-county, Bumula sub-county, Webuye East sub-countyand Kabuchai sub-county respectively.

4.2.5Devolution of Transport Function

The study sought to establish the trend in the kilometres of access roads opened in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Figure 4.5.

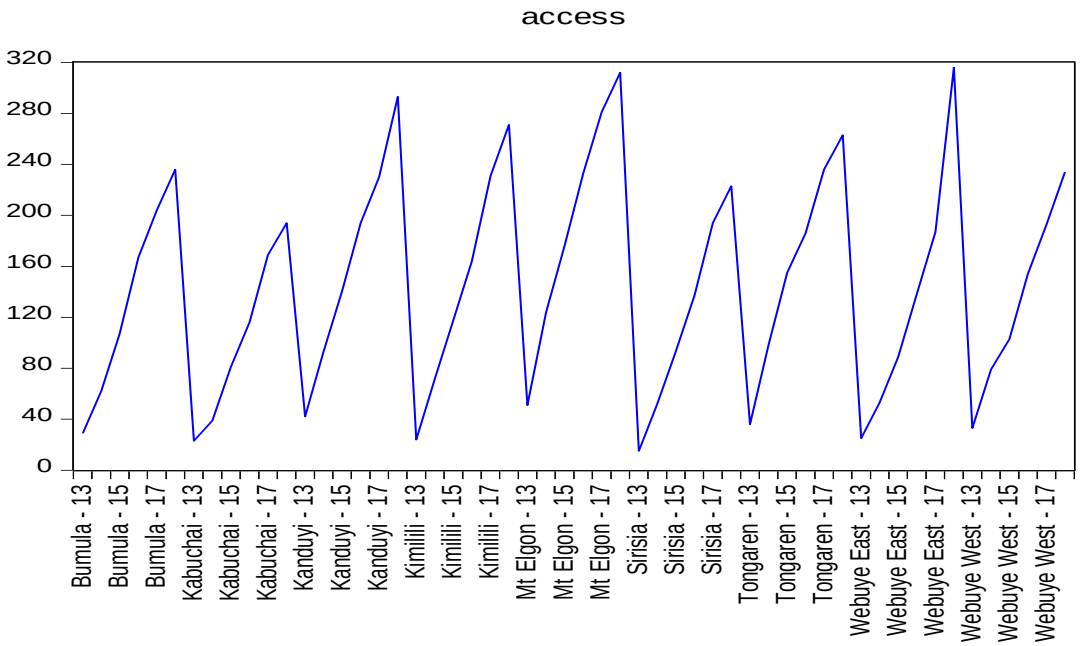

Figure 4.5: Kilometres of Access Roads Opened from 2013 to 2018

Source: Author, 2020

The findings indicate that there was a general rise in the kilometres of access roads opened in each of the nine sub-counties in Bungoma county between 2013 and 2018. One of the reasons is that the figures are cumulative. Further analysis on sub-county basis reveals that Webuye East sub-county had the highest general increasing trend in the kilometres of access roads opened followed by Mt. Elgon sub-county, Kanduyi sub-county, Kimilili sub-county, Tongaren sub-county, Bumula sub-county, Webuye West sub-county, Sirisia sub-county andKabuchai sub-countyrespectively.

4.2.6Devolution of Water Function

The study sought to establish the trend in the number of water connections in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Figure 4.6.

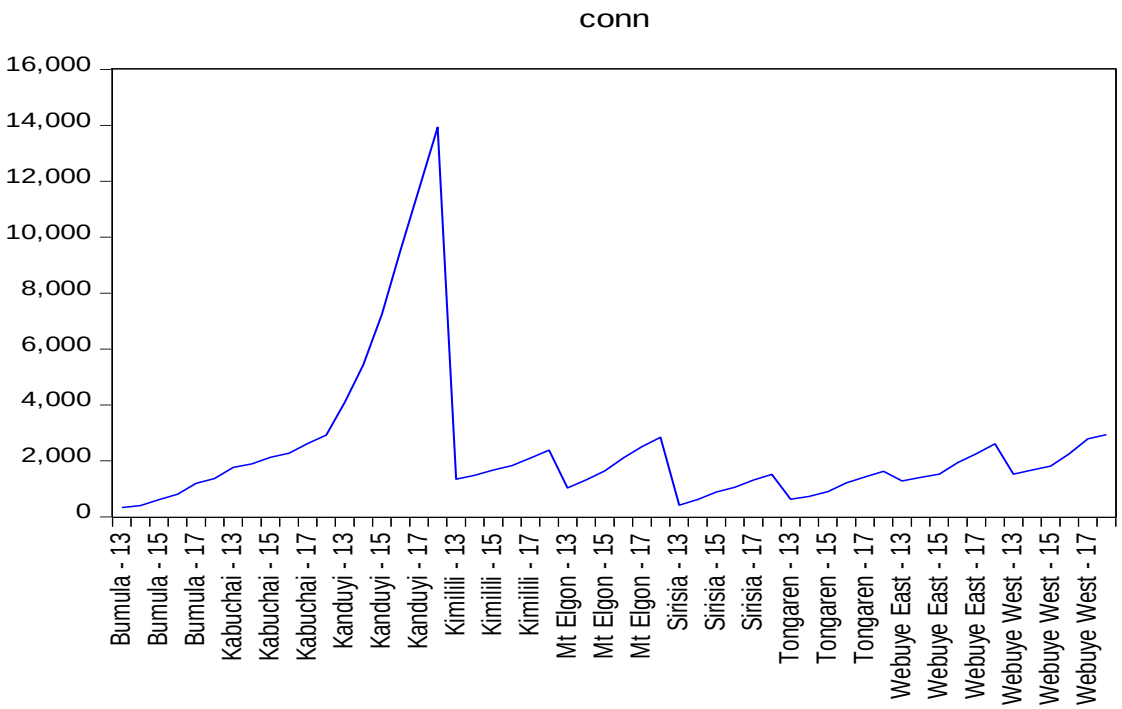

Figure 4.6: Number of Water Connections from 2013 to 2018
Source: Author, 2020

The findings indicate that there was a general rise in the number of water connections in each of the nine sub-counties in Bungoma county between 2013 and 2018. One of the reasons is that the figures are cumulative. Further analysis on sub-county basis reveals that Kanduyi sub-county had the highest general increasing trend in the number of water connections followed byKabuchai sub-county, Mt. Elgon sub-county, Webuye West sub-county, Webuye East sub-county, Kimilili sub-county, Tongaren sub-county, Sirisia sub-county and Bumula sub-county respectively.

4.2.7Economic Development in Bungoma County, Kenya

The study sought to establish the trend in the annual human poverty index (HPI)in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Figure 4.7.

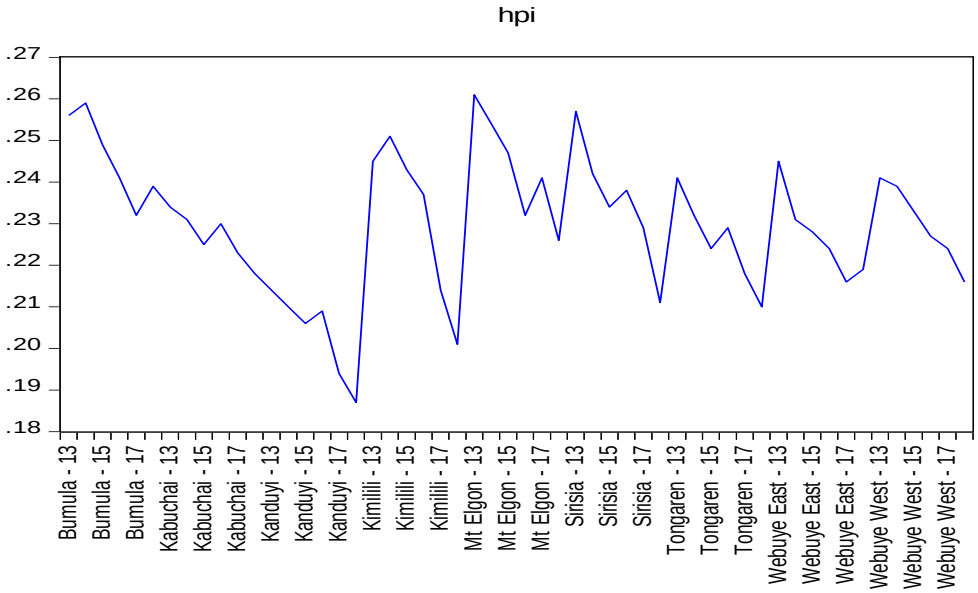

Figure 4.7: Annual Human Poverty Index from 2013 to 2018

Source: Author, 2020

The findings indicate that there was a general decline in the annual human poverty index in each of the nine sub-counties in Bungoma county between 2013 and 2018. Further analysis on sub-county basis reveals that Kanduyi sub-county had the highest general declining trend in the annual human poverty index followed by Kimilili sub-county,Tongaren sub-county,Sirisia sub-county, Webuye East sub-county, Webuye West sub-county, Mt. Elgon sub-county, Kabuchai sub-countyandBumula sub-county respectively.

4.3 Panel Covariance Analysis

The study also analysed the way the dependent variable-economic development in Bungoma county, Kenya- and the independent variables- devolution of agriculture function, devolution of education function, devolution of health function, devolution of trade function, devolution of transport function and devolution of water function move in tandem. This analysis does not adjust for variable scales as it is done in correlation analysis. It enables the examination of how variables move together and it could be positive, negative or no covariance at all.

4.3.1 Ordinary Covariance Analysis

The study examined the ordinary covariance between each independent variable and the dependent variable. The study's pertinent analysis results are depicted in Table 4.3.

Table 4.3: Ordinary Covariance Analysis

Covariance Analysis: Ordinary						
Sample: 2013 2018						
Included observations: 54						
Covariance						
Probability	FARM	INSTR	MED	STALL	ACCESS	CONN
HPI	-0.436972	-1.338607	-1.136815	-0.146361	-0.799007	-29.53202
	0.0000	0.0000	0.0015	0.0000	0.0000	0.0000

Source: Author, 2020

The findings indicate that number of farmers supported per year and human poverty index covary negatively and significantly (Cov = -0.436972; $p < 0.05$). This implies that the number of farmers supported per year andhuman poverty index in Bungoma county, Kenyamove in opposite directions. The study found out that number of ECDE teachers and VTC instructors recruited and human poverty indexcovary negatively and significantly (Cov = -1.338607; $p < 0.05$). This implies that the number of ECDE teachers and VTC instructors recruited andhuman poverty index in Bungoma county, Kenyamove in opposite directions.

It was revealed that number of medical practitioners recruited and human poverty index covary negatively and significantly (Cov = -1.136815; $p < 0.05$). This implies that the number of medical practitioners recruited andhuman poverty index in Bungoma county, Kenyamove in opposite directions.It was shown thatnumber of stalls and human poverty index covary negatively and significantly (Cov = -0.146361; $p < 0.05$). This implies that the number of stallsandhuman poverty index in Bungoma county, Kenya move in opposite directions.

The study noted thatkilometres of access roads opened and human poverty indexcovary negatively and significantly (Cov = -0.799007; $p < 0.05$). This implies that the kilometres of access roads opened andhuman poverty index in Bungoma county, Kenya move in opposite directions.It was found out that number of water connections and human poverty index covary negatively and significantly (Cov = -29.53202; $p < 0.05$). This implies that the number of water connections andhuman poverty index in Bungoma county, Kenya move in opposite directions.

4.3.2 Long-run Covariance Analysis

The study examined the covariance between the independent variables and the dependent variables in the long run. The Kernel used was Bartlett while the bandwidth method was Newey-West Fixed, with no lag specification for whitening options.The study's pertinent analysis results are depicted in Table 4.4.

Table 4.4: Panel Long Run Covariance Analysis

	FARM	INSTR	MED	STALL	ACCESS	CONN
HPI	-0.325047	-1.685463	-0.197443	-0.125762	-1.337514	-12.25614

Source: Author, 2020

The findings indicate thatnumber of farmers supported per year and human poverty indexnegatively covary in the long-run (Cov = -0.325047). This implies that the number of farmers supported per year andhuman poverty index in Bungoma county, Kenya move in opposite directions in the long-run.

The study found out that number of ECDE teachers and VTC instructors recruited and human poverty indexnegatively covary in the long-run (Cov = -1.685463). This implies

that the number of ECDE teachers and VTC instructors recruitedandhuman poverty index in Bungoma county, Kenyamove in opposite directions in the long-run.

It was revealed that number of medical practitioners recruited and human poverty indexnegatively covary in the long-run (Cov = -0.197443). This implies that the number of medical practitioners recruited andhuman poverty index in Bungoma county, Kenyamove in opposite directions in the long-run.

It was shown that number of stalls and human poverty indexnegatively covary in the long-run (Cov = -0.125762). This implies that the number of stallsand human poverty index in Bungoma county, Kenya move in opposite directions in the long-run.

The study noted that kilometres of access roads opened and human poverty indexnegatively covary in the long-run (Cov = -1.337514). This implies that the kilometres of access roads opened andhuman poverty index in Bungoma county, Kenya move in opposite directions in the long-run.

It was found out that number of water connections and human poverty indexnegatively covary in the long-run (Cov = -12.25614). This implies that the number of water connectionsand human poverty index in Bungoma county, Kenyamove in opposite directions in the long-run.

4.4Panel Correlation Analysis

The study also examined the association between the dependent variable-economic development in Bungoma county, Kenya- and each independent variable-devolution of agriculture function, devolution of education function, devolution of health function, devolution of trade function, devolution of transport function and devolution of water function. Correlation analysis is different from covariance analysis in that it adjusts for the scale of the variables.The relationship is considered strong when $\pm 0.5 < r \leq \pm 1$, moderate when $r = \pm 0.5$ and weak when $0 < r < \pm 0.5$.The study's pertinent analysis results are depicted in Table 4.5.

Table 4.5: Panel Correlation Analysis

Covariance Analysis: Ordinary						
Sample: 2013 2018						
Included observations: 54						
Correlation						
Probability	FARM	INSTR	MED	STALL	ACCESS	CONN
HPI	-0.639020	-0.554725	-0.606909	-0.726147	-0.586697	-0.706947
	0.0000	0.0000	0.0015	0.0000	0.0000	0.0000

Source: Author, 2020

The findings indicate thatnumber of farmers supported per year and human poverty index are negatively and significantly correlated. The relationship is strong ($r = -0.639020$; $p < 0.05$). The implication isthat devolution of agriculture function isassociated with enhancedeconomic development in Bungoma county, Kenya.

The study found out thatnumber of ECDE teachers and VTC instructors recruited and human poverty index are negatively and significantly correlated. The relationship is

strong($r = -0.554725$; $p < 0.05$). The implication is that the devolution of education function isassociated with enhanced economic development in Bungoma county, Kenya.

It was revealed thatnumber of medical practitioners recruited and human poverty indexare negatively and significantly correlated. The relationship is strong($r = -0.606909$; $p < 0.05$). The implication is that devolution of health function isassociated with enhanced economic development in Bungoma county, Kenya.

It was shown that number of stalls and human poverty indexare negatively and significantly correlated. The relationship is strong ($r = -0.726147$; $p < 0.05$). The implication is that the devolution of trade function isassociated with enhanced economic development in Bungoma county, Kenya.

The study noted thatkilometres of access roads opened and human poverty index are negatively and significantly correlated. The relationship is strong ($r = -0.586697$; $p < 0.05$). The implication is that devolution of transport function isassociated with enhancedeconomic development in Bungoma county, Kenya.

It was found out thatnumber of water connections and human poverty index are negatively and significantly correlated. The relationship is strong ($r = -0.706947$; $p < 0.05$). This implies that devolution of water function isassociated with enhanced economic development in Bungoma county, Kenya.

4.5 Panel Cross-section Dependence Analysis

The study also analysed the dependence between cross-sections, that is, the devolved government functions and human poverty index in each of the nine sub-counties in Bungoma county, Kenya. The tests used were; Breusch-Pagan (1980) LM (BPLM), Pesaran (2004) scaled LM (PSLM), Baltagi, Fengand Kao (2012) bias-corrected scaled LM (BFKLM)and Pesaran (2004) CD (PCD). The results are discussed in this section.

4.5.1 Cross-section Dependence for Devolution of Agriculture Function

The study examined the cross-sectional correlation between the number of farmers supported per year in the nine sub counties in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Table 4.6.

Table 4.6: Cross-section Dependence for Devolution of Agriculture Function

Cross-Section Dependence Test			
Series: FARM			
Test	Statistic	d.f.	Prob.
BPLM	162.8086	36	0.0000
PSLM	14.94454		0.0000
BFKLM	14.04454		0.0000
PCD	12.69291		0.0000

Source: Author, 2020

The results of analysis indicate that Breusch-Pagan LM statistic = 162.8086 ($p < 0.05$),Pesaran scaled LM statistic =14.94454 ($p < 0.05$),BFKLMstatistic = 14.04454 ($p < 0.05$)and PCDstatistic = 12.69291 ($p < 0.05$). The null hypothesis that there is no cross-sectional dependence for the number of farmers supported per year in the nine sub counties in Bungoma county, Kenya was therefore rejected. This implies that there is

significant correlation at sub-county level forthe devolved agriculture function in Bungoma county, Kenya.

4.5.2 Cross-section Dependence forDevolution of Education Function

The study examined the cross-sectional correlation between the number of ECDE teachers and VTC instructors recruited in the nine sub counties in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Table 4.7.

Table 4.7: Cross-section Dependence forDevolution of Education Function

Cross-Section Dependence Test			
Series: INSTR			
Test	Statistic	d.f.	Prob.
BPLM	214.6139	36	0.0000
PSLM	21.04985		0.0000
BFKLM	20.14985		0.0000
PCD	14.64964		0.0000

Source: Author, 2020

The results of analysis indicate that Breusch-Pagan LM statistic = 214.6139 ($p < 0.05$), Pesaran scaled LM statistic = 21.04985($p < 0.05$), BFKLM statistic = 20.14985 ($p < 0.05$) and PCD statistic = 14.64964 ($p < 0.05$). The null hypothesis that there is no cross-sectional dependence for the number of ECDE teachers and VTC instructors recruited in the nine sub counties in Bungoma county, Kenya was therefore rejected. This implies that there is significant correlation at sub-county level for the devolved education function in Bungoma county, Kenya.

4.5.3 Cross-section Dependence forDevolution of Health Function

The study examined the cross-sectional correlation between the number of medical practitioners recruitedin the nine sub counties in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Table 4.8.

Table 4.8: Cross-section Dependence forDevolution of HealthFunction

Cross-Section Dependence Test			
Series: MED			
Test	Statistic	d.f.	Prob.
BPLM	197.1461	36	0.0000
PSLM	18.99125		0.0000
BFKLM	18.09125		0.0000
PCD	14.03198		0.0000

Source: Author, 2020

The results of analysis indicate that Breusch-Pagan LM statistic = 197.1461($p < 0.05$), Pesaran scaled LM statistic = 18.99125 ($p < 0.05$), BFKLM statistic = 18.09125 ($p < 0.05$) and PCD statistic = 14.03198 ($p < 0.05$). The null hypothesis that there is no cross-sectional dependence for the number of medical practitioners recruited in the nine sub counties in Bungoma county, Kenya was therefore rejected. This implies that there is significant correlation at sub-county level forthe devolved health function in Bungoma county, Kenya.

4.5.4 Cross-section Dependence forDevolution of Trade Function

The study examined the cross-sectional correlation between the number of stalls in the nine sub counties in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Table 4.9.

Table 4.9: Cross-section Dependence forDevolution of Trade Function

Cross-Section Dependence Test			
Series: STALL			
Test	Statistic	d.f.	Prob.
BPLM	188.9722	36	0.0000
PSLM	18.02794		0.0000
BFKLM	17.12794		0.0000
PCD	13.73691		0.0000

Source: Author, 2020

The results of analysis indicate that Breusch-Pagan LM statistic = 188.9722 ($p < 0.05$), Pesaran scaled LM statistic = 18.02794 ($p < 0.05$), BFKLM statistic = 17.12794 ($p < 0.05$) and PCD statistic = 13.73691 ($p < 0.05$). The null hypothesis that there is no cross-sectional dependence for the number of stalls in the nine sub counties in Bungoma county, Kenya was therefore rejected. This implies that there is significant correlation at sub-county level forthe devolved trade function in Bungoma county, Kenya.

4.5.5 Cross-section Dependence forDevolution of Transport Function

The study examined the cross-sectional correlation between the kilometres of access roads opened in the nine sub counties in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Table 4.10.

Table 4.10: Cross-section Dependence forDevolution of Transport Function

Cross-Section Dependence Test			
Series: ACCESS			
Test	Statistic	d.f.	Prob.
BPLM	208.1340	36	0.0000
PSLM	20.28619		0.0000
BFKLM	19.38619		0.0000
PCD	14.42375		0.0000

Source: Author, 2020

The results of analysis indicate that Breusch-Pagan LM statistic = 208.1340 ($p < 0.05$), Pesaran scaled LM statistic = 20.28619 ($p < 0.05$), BFKLM statistic = 19.38619 ($p < 0.05$) and PCD statistic = 14.42375 ($p < 0.05$). The null hypothesis that there is no cross-sectional dependence for the kilometres of access roads opened in the nine sub counties in Bungoma county, Kenya was therefore rejected. This implies that there is significant correlation at sub-county level for the devolved transport function in Bungoma county, Kenya.

4.5.6 Cross-section Dependence for Devolution of Water Function

The study examined the cross-sectional correlation between the number of water connections in the nine sub counties in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Table 4.11.

Table 4.11: Cross-section Dependence forDevolution of Water Function

Cross-Section Dependence Test			
Series: CONN			
Test	Statistic	d.f.	Prob.
BPLM	211.6649	36	0.0000
PSLM	20.70231		0.0000
BFKLM	19.80231		0.0000
PCD	14.54845		0.0000

Source: Author, 2020

The results of analysis indicate that Breusch-Pagan LM statistic = 211.6649($p < 0.05$), Pesaran scaled LM statistic = 20.70231($p < 0.05$), BFKLM statistic = 19.80231($p < 0.05$) and PCD statistic = 14.54845($p < 0.05$). The null hypothesis that there is no cross-sectional dependence for the number of water connections in the nine sub counties in

Bungoma county, Kenya was therefore rejected. This implies that there is significant correlation at sub-county level for the devolved water function in Bungoma county, Kenya.

4.5.7 Cross-section Dependence for Human poverty index

The study examined the correlation between the human poverty indexin the nine sub counties in Bungoma county, Kenya. The study's pertinent analysis results are depicted in Table 4.12.

Table 4.12: Cross-section Dependence for Human Poverty Index

Cross-Section Dependence Test			
Series: HPI			
Test	Statistic	d.f.	Prob.
BPLM	158.9923	36	0.0000
PSLM	14.49478		0.0000
BFKLM	13.59478		0.0000
PCD	12.55099		0.0000

Source: Author, 2020

The results of analysis indicate that Breusch-Pagan LM statistic = 158.9923 ($p < 0.05$), Pesaran scaled LM statistic = 14.49478 ($p < 0.05$), BFKLM statistic = 13.59478 ($p < 0.05$) and PCD statistic = 12.55099 ($p < 0.05$). The null hypothesis that there is no cross-sectional dependence for the human poverty indexin the nine sub counties in Bungoma county, Kenya was therefore rejected. This implies that there is significant correlation at sub-county level in the human poverty indexin Bungoma county, Kenya.

4.6Lag Length Selection

The selection of the numbers of lags to be included in the analysis requires balancing of the marginal benefits and costs. If the order of estimation is too low, the research faces a risk of omitting crucial information contained in the omitted lag periods. On the other hand, if it is set too high then many unnecessary coefficients will be estimated. The study used Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and Hannan-Quinn Information Criterion (HQ)to select the appropriate lag length for the study. The study's pertinent analysis results are depicted in Table 4.13.

Table 4.13: Lag Length Selection

VAR Lag Order Selection Criteria

Endogenous variables: HPI FARM INSTR MED STALL ACCESS CONN

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1097.018	NA	1.02e+18	61.33431	61.64222	61.44178
1	-754.1990	533.2735*	8.78e+10*	45.01105	47.47431*	45.87079*
2	-704.3398	58.16907	1.16e+11	44.96332*	49.58192	46.57533

* indicates lag order selected by the criterion

Source: Author, 2020

The findings indicate that three selection criterions indicate a lag length of 1; FPE, SIC and HQ. Only the AIC indicated a lag length of 2. The study therefore chose a lag 1. This implies that cointegration tests and panel causality tests were performaned at lag 1.

4.7 Panel Causality Testing

The study also examined the pairwise effect of each independent variable on the dependent variable and vice-versa over time. The Granger causality test type was the stacked test with common coefficients at lag 1. Granger causality measure precedence and content of information. The results of panel Granger causality tests are shown in Table 4.14

Table 4.14: Pairwise Granger Causality Tests

Pairwise Granger Causality Tests

Sample: 2013 2018
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
FARM does not Granger Cause HPI	45	1.56769	0.2175
HPI does not Granger Cause FARM		5.57595	0.0229
INSTR does not Granger Cause HPI	45	0.14642	0.7039
HPI does not Granger Cause INSTR		0.14576	0.7045
MED does not Granger Cause HPI	45	0.32931	0.5691
HPI does not Granger Cause MED		0.22577	0.6371
STALL does not Granger Cause HPI	45	4.54255	0.0390
HPI does not Granger Cause STALL		0.40837	0.5263
ACCESS does not Granger Cause HPI	45	2.86794	0.0978
HPI does not Granger Cause ACCESS		0.08154	0.7766
CONN does not Granger Cause HPI	45	1.69102	0.2006
HPI does not Granger Cause CONN		0.06967	0.7931

Source: Author, 2020

According to the results of analysis, the null hypothesis that number of farmers supported per year does not granger cause human poverty index was not rejected ($F = 1.56769$; $p > 0.05$). This implies that past values of number of farmers supported per year do not explain variations in the present values of human poverty index. The null hypothesis that human poverty indexdoes not granger cause number of farmers

supported per year was rejected($F = 5.57595$; $p < 0.05$). This implies that past values of human poverty indexexplain variations in the present values of number of farmers supported per year.

The null hypothesis that number of ECDE teachers and VTC instructors recruited does not granger cause human poverty index was notrejected ($F = 0.14642$; $p > 0.05$). This implies that past values of number of ECDE teachers and VTCinstructors recruiteddo not explain variations in the present values of human poverty index. The null hypothesis that human poverty index does not granger cause number of ECDE teachers and VTC instructors recruited was not rejected($F = 0.14576$; $p > 0.05$). This implies that past values of human poverty index do not explain variations in the present values of number of ECDE teachers and VTC instructors recruited.

The null hypothesis that number of medical practitioners recruited does not granger cause human poverty index was not rejected ($F = 0.32931$; $p > 0.05$). This implies that past values of number of medical practitioners recruited do not explain variations in the present values of human poverty index. The null hypothesis that human poverty index does not granger cause number of medical practitioners recruited was not rejected ($F = 0.22577$; $p > 0.05$). This implies that past values of human poverty index do not explain variations in the present values of number of medical practitioners recruited.

The null hypothesis that number of stalls does not granger cause human poverty index wasrejected ($F = 4.54255$; $p < 0.05$). This implies that past values of number of

stallsexplain variations in the present values of human poverty index. The null hypothesis that human poverty index does not granger cause number of stalls was not rejected ($F = 0.40837$; $p > 0.05$). This implies that past values of human poverty indexdo not explain variations in the present values of number of stalls.

The null hypothesis that kilometres of access roads opened does not granger cause human poverty index was not rejected ($F = 2.86794$; $p > 0.05$). This implies that past values of kilometres of access roads opened do not explain variations in the present values of human poverty index. The null hypothesis that human poverty index does not granger cause kilometres of access roads opened was not rejected ($F = 0.08154$; $p > 0.05$). This implies that past values of human poverty indexdoes not explain variations in the present values of kilometres of access roads opened.

According to the results of analysis, the null hypothesis that number of water connections does not granger cause human poverty index was not rejected ($F = 1.69102$; $p > 0.05$). This implies that past values of number of water connections do not explain variations in the present values of human poverty index. The null hypothesis that human poverty index does not granger cause number of water connections wasnot rejected ($F = 0.06967$; $p > 0.05$). This implies that past values of human poverty indexdo not explain variations in the present values of number of water connections per year.

4.8 Panel Unit Root Testing

The study examined the stationarity of panel data. The importance of this analysis is that it informs the study whether the results of regression obtained are spurious or not; as non-stationarity results in spurious regression results. The statistics used for stationarity analysis were Levin, Lin & Chu t* (LLL), ADF - Fisher Chi-square (ADF) and PP - Fisher Chi-square (PP). The panel unit root tests were conducted with no intercept. The null hypothesis using Levin, Lin & Chu t* test is that there is a common unit root. The null hypothesis for ADF and PP tests is that there is an individual unit root.

4.8.1 Panel Unit Root Tests at Level

The study conducted panel unit root tests at level. The results are presented in Table 4.15.

Table 4.15: Panel Unit Root Tests at Level

Method	FARM	INSTR	MED	STALL	ACCESS	CONN	HPI
	Statistic and (Probability)						
Levin, Lin & Chu t*	6.83128	4.53366	10.9303	7.52053	9.76332	15.3556	-6.77658
	(1.0000)	(1.0000)	(1.0000)	(1.0000)	(1.0000)	(1.0000)	(0.000)
ADF - Fisher Chi-square	0.80387	1.27741	0.20968	0.62845	0.17353	0.03132	54.5859
	(1.0000)	(1.0000)	(1.0000)	(1.0000)	(1.0000)	(1.0000)	(0.0000)
PP - Fisher Chi-square	0.30113	0.75845	0.1127	0.18862	0.28588	0.01589	92.7017
	(1.0000)	(1.0000)	(1.0000)	(1.0000)	(1.0000)	(1.0000)	(0.0000)

Source: Author, 2020

The results indicate that number of farmers supported per year was non-stationary at level (Levin, Lin & Chu t* = 6.83128, $p > 0.05$; ADF = 0.80387, $p > 0.05$; PP = 0.30113, $p > 0.05$).The number of ECDE teachers and VTC instructors recruitedwas

non-stationary at level(Levin, Lin & Chu t* = 4.53366, p > 0.05; ADF = 1.27741, p > 0.05; PP= 0.75845, p > 0.05).The number of medical practitioners recruitedwas non-stationary at level(Levin, Lin & Chu t* = 10.9303, p > 0.05; ADF= 0.20968, p > 0.05; PP= 0.11277, p > 0.05).

The number of stallswas non-stationary at level(Levin, Lin & Chu t* = 7.52053, p > 0.05; ADF= 0.62845, p > 0.05; PP= 0.18862, p > 0.05).The kilometres of access roads opened was non-stationary at level (Levin, Lin & Chu t* = 9.76332, p > 0.05; ADF = 0.17353, p > 0.05; PP= 0.28588, p > 0.05).The number of water connections was non-stationary at level(Levin, Lin & Chu t* = 15.3556, p > 0.05; ADF= 0.03132, p > 0.05; PP= 0.01589, p > 0.05).The human poverty index was stationary at level(Levin, Lin & Chu t* = -6.77658, p < 0.05; ADF= 54.5859, p < 0.05; PP= 92.7017, p < 0.05).

4.8.2 Panel Unit Root Tests at First Difference

The study conducted panel unit root tests at first difference. The study's pertinent analysis results are depicted in Table 4.16.

Table 4.16: Panel Unit Root Tests at First Difference

Method	FARM	INSTR	MED	STALL	ACCESS	CONN	HPI
	Statistic and (Probability)						
LLL	-4.20818	-4.00827	-3.01735	-2.55832	-2.09568	0.75695	-3.89624
	(0.0000)	(0.0000)	(0.0013)	(0.0053)	(0.0181)	(0.7755)	(0.0000)
ADF	32.5869	31.5500	24.2642	24.3570	18.2485	9.05912	34.3577
	(0.0187)	(0.0248)	(0.1466)	(0.1437)	(0.4394)	(0.9584)	(0.0114)
PP - Fisher Chi-square	34.2382	30.2401	24.5581	23.3530	22.8690	7.61500	33.6807
	(0.0118)	(0.0352)	(0.1376)	(0.1774)	(0.1957)	(0.9838)	(0.0138)

Source: Author, 2020

The results indicate that number of farmers supported per year was stationary at first difference (Levin, Lin & Chu t* = -4.20818, $p < 0.05$; ADF - Fisher Chi-square = 32.5869, $p < 0.05$; PP - Fisher Chi-square= 34.2382, $p < 0.05$).The number of ECDE teachers and VTC instructors recruited was stationary at first difference(Levin, Lin & Chu t* = -4.00827, $p <0.05$; ADF - Fisher Chi-square = 31.5500, $p < 0.05$; PP - Fisher Chi-square= 30.2401, $p <0.05$).The number of medical practitioners recruited was stationary at first difference(LLL = -3.01735, $p < 0.05$). The number of medical practitioners recruited was non-stationary at first difference(ADF= 24.2642, $p > 0.05$; PP - Fisher Chi-square= 24.5581, $p > 0.05$).

The number of stalls was stationary at first difference, assuming common unit root process(LLL = -2.55832 $p < 0.05$). The number of stalls was non-stationary at first difference, assuming individual unit root process (ADF= 24.3570, $p > 0.05$; PP - Fisher Chi-square= 23.3530, $p > 0.05$).The kilometres of access roads opened was stationary at first difference, assuming common unit root process (LLL = -2.09568, $p < 0.05$).The kilometres of access roads opened was non-stationary at first difference, assuming individual unit root process (ADF= 18.2485, $p > 0.05$; PP - Fisher Chi-square= 22.8690, $p > 0.05$).The number of water connections was non-stationary at first difference(Levin, Lin & Chu t* = 0.75695, $p > 0.05$; ADF - Fisher Chi-square = 9.05912, $p > 0.05$; PP - Fisher Chi-square= 7.61500, $p > 0.05$).The human poverty index wasstationary at first difference(Levin, Lin & Chu t* = -3.89624, $p <0.05$; ADF - Fisher Chi-square = 34.3577, $p < 0.05$; PP - Fisher Chi-square= 33.6807, $p < 0.05$).

4.8.3 Panel Unit Root Tests at Second Difference

The study conducted stationarity tests at second difference. The study's pertinent analysis results are depicted in Table 4.17.

Table 4.17: Panel Unit Root Tests at Second Difference

Method	FARM	INSTR	MED	STALL	ACCESS	CONN	HPI
	Statistic and (Probability)						
LLL	-11.9618	-14.8196	-14.4618	-14.5060	-10.3819	-9.35305	-8.82852
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
ADF	63.1086	93.4802	78.2589	63.8336	69.6216	59.6270	62.2770
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0017)
PP	59.6237	90.6016	79.2672	66.0362	69.6713	61.9319	65.0971
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Source: Author, 2020

The results indicate that number of farmers supported per year was stationary at second difference (Levin, Lin & Chu t* = -11.9618, $p < 0.05$; ADF - Fisher Chi-square = 63.1086, $p < 0.05$; PP - Fisher Chi-square= 59.6237, $p < 0.05$).The number of ECDE teachers and VTC instructors recruited was stationary at second difference (LLL = -14.8196, $p < 0.05$; ADF = 93.4802, $p < 0.05$; PP - Fisher Chi-square= 90.6016, $p < 0.05$).The number of medical practitioners recruited was stationary at second difference(LLL = -14.4618, $p < 0.05$; ADF = 78.2589, $p < 0.05$; PP - Fisher Chi-square= 79.2672, $p < 0.05$).

The number of stalls was stationary at second difference(LLL = -14.5060, $p < 0.05$; ADF= 63.8336, $p < 0.05$; PP - Fisher Chi-square= 66.0362, $p < 0.05$).The kilometres of access roads opened was stationary at second difference(Levin, Lin & Chu t* = -10.3819, $p < 0.05$; ADF - Fisher Chi-square = 69.6216, $p < 0.05$; PP - Fisher Chi-square= 69.6713, $p < 0.05$).The number of water connections was stationary at second difference(Levin, Lin & Chu t* = -9.35305, $p < 0.05$; ADF - Fisher Chi-square = 59.6270, $p < 0.05$; PP - Fisher Chi-square= 61.9319, $p < 0.05$).The human poverty index

was stationary at second difference (Levin, Lin & Chu t* = -8.82852, $p < 0.05$; ADF - Fisher Chi-square = 62.2770, $p < 0.05$; PP - Fisher Chi-square= 65.0971, $p < 0.05$).

4.8.4 Summary of Panel Unit Root Tests

The results reveal that number of farmers supported per year, number of ECDE teachers and VTC instructors recruited, number of medical practitioners recruited, number of stalls, kilometres of access roads opened and number of water connectionswere non stationary at level. Only human poverty index was stationary at level.It was shown that the number of farmers supported per year, number of ECDE teachers and VTC instructors recruitedand human poverty index were stationary at first difference. The number of medical practitioners recruited, number of stalls, kilometres of access roads opened and number of water connectionswere non-stationary at first difference. It was shown that number of farmers supported per year, number of ECDE teachers and VTC instructors recruited, number of medical practitioners recruited, number of stalls, kilometres of access roads opened, number of water connections and human poverty index were stationary at second difference. It was therefore necessary to conduct panel cointegration tests in order to verify if long run relationships exist as regression analysis would be done at level.

4.9Panel Cointegration Testing

The study examined whether stable, long run relationships exist. The cointegration tests were conducted because non-stationarity was detected in panel data.The test conducted was Kao residual cointegration test (Engle-Granger based) at lag 1. It was assumed that

there is no deterministic trend. The study's pertinent analysis results are depicted in Table 4.18.

Table 4.18: Rao Residual Cointegration Test Results

Kao Residual Cointegration Test		
Series: HPI FARM INSTR MED STALL ACCESS CONN Newey-West automatic bandwidth selection and Bartlett kernel		
	t-Statistic	Prob.
ADF	-3.819526	0.0001
Residual variance	4.61E-05	
HAC variance	3.21E-05	

Source: Author, 2020

According to the results of analysis based on Kao residual cointegration test, the null hypothesis that there is no integration was rejected (ADF t-statistic = -3.819526; $p < 0.05$). It was concluded that there is cointegration among the variables of the study. The implications of these results is that spurious regression results would not be obtained despite the presence of non-stationarity in the data.

4.10 Testing for Random Effects and Fixed Effects

The study conducted statistical tests to examine if random effects exist so that a choice would be made whether a pooled multiple regression model was suitable for the data.

4.10.1 Lagrange Multiplier Tests for Random Effects

Lagrange Muliplier tests for random effects were conducted to examine the existence of both cross-section and period random effects. Breusch-Pagan, Honda, King-Wu,

Standardized Honda, Standardized King-Wu and Gourieroux, et al. Lagrange Multiplier tests were conducted. The results of analysis are shown in Table 4.19.

Table 4.19: Lagrange Multiplier Tests for Random Effects

Null hypotheses: No effects

Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	23.25385	1.684108	24.93796
	(0.0000)	(0.1944)	(0.0000)
Honda	4.822225	-1.297732	2.492193
	(0.0000)	--	(0.0063)
King-Wu	4.822225	-1.297732	1.972592
	(0.0000)	--	(0.0243)
Standardized Honda	8.311160	-0.927701	0.849592
	(0.0000)	--	(0.1978)
Standardized King-Wu	8.311160	-0.927701	0.183623
	(0.0000)	--	(0.4272)
Gourieroux, et al.*	--	--	23.25385
			(< 0.01)

*Asymptotic critical values:

1%	7.289
5%	4.231
10%	2.952

Source: Author, 2020

According to the results of analysis, the null hypothesis that there are no cross-section random effects wasrejected (Breusch-Pagan = 23.25385, p <0.05; Honda = 4.822225, p < 0.05; King-Wu =4.822225, p > 0.05; Standardized Honda= 8.311160, p < 0.05; Standardized King-Wu = 8.311160, p <0.05). This implies that it would be important to test a regression model with cross-section random effects.The null hypothesis that there are no period random effects was not rejected(Breusch-Pagan = 1.684108, p > 0.05). This implies that it would not be necessary to use a regression model with time/period random effects.

The null hypothesis that there are no cross-section and period random effects was rejected (Breusch-Pagan = 24.93796, $p < 0.05$; Honda = 2.492193, $p < 0.05$; King-Wu = 1.972592, $p < 0.05$). On the other hand, the null hypothesis that there are no cross-section and period random effects was not rejected based on Standardized Honda (statistic = 0.849592, $p > 0.05$), Standardized King-Wu (statistic = 0.183623, $p > 0.05$) and Gourieroux, et al. (statistic = 23.25385, $p > 0.05$) tests. This implies that it would be necessary to test a regression model with cross-section and period random effects.

4.10.2 Estimation with Random Effects

The study carried out regression analysis with both cross-section and period random effects and then conducted the Hausman test. The Hausman test is used to determine whether to use fixed effects or random effects in panel estimations. The null hypothesis for the Hausman test is that the random effects are correlated. If the null hypothesis is not rejected, it implies that the fixed effects model is the most suitable to be fitted to the panel data. The results of analysis are shown in Table 4.20.

Table 4.20: Hausman Test for Period and Cross-section Random Effects

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	6	1.0000
Period random	1.188186	6	0.9775
Cross-section and period random	0.000000	6	1.0000

* Cross-section test variance is invalid. Hausman statistic set to zero.
** WARNING: Estimated period random effects variance is zero.

Source: Author, 2020

According to the results of analysis, the null hypothesis that cross-section random effects are correlated was not rejected (Chi-Sq. Statistic = 0.000000; $p > 0.05$). This implies that

it would be appropriate to use a regression model with cross-section fixed effects for estimation. The null hypothesis that period random effects are correlated was not rejected (Chi-Sq. Statistic = 1.188186; p > 0.05).The estimate of the period random effects indicate that there are no period random effects (they have no variance), hence testing for the difference between random effects and fixed effects may not be a valid thing to do. The null hypothesis that cross-section and period random effects are correlated was notrejected (Chi-Sq. Statistic = 0.000000; p > 0.05). This implies that it would not be appropriate to test a regression model with both cross-section and period random effects. The results generally imply that it would be appropriate to use a model with fixed effects.

4.10.3 Estimation with Fixed Effects

The study also conducted regression analysis with fixed effects in order to test whether the fixed effects model, with cross-section fixed effects or period fixed effects or both cross-section and period fixed effects, was appropriate for the study. The results of redundant likelihood ratio test for a model with period and cross-section fixed effects are shown in Table 4.21.

Table 4.21: Likelihood Ratio Test of Redundant Cross-section and Period Fixed Effects

Redundant Fixed Effects Tests			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	10.220567	(8,34)	0.0000
Cross-section Chi-square	66.160676	8	0.0000
Period F	0.820418	(5,34)	0.5438
Period Chi-square	6.151062	5	0.2918
Cross-Section/Period F	8.234466	(13,34)	0.0000
Cross-Section/Period Chi-square	76.827968	13	0.0000

Source: Author, 2020

The results indicate that the null hypothesis that cross-section fixed effects are redundant was rejected (Cross-section F = 10.220567, $p < 0.05$; Cross-section Chi-square = 66.160676, $p < 0.05$). The null hypothesis that period fixed effects are redundant was not rejected (Period F = 0.820418, $p > 0.05$; Period Chi-square = 6.151062, $p > 0.05$). The null hypothesis that cross-section and period fixed effects are redundant was rejected (Cross-Section/Period F = 8.234466, $p < 0.05$; Cross-Section/Period Chi-square = 76.827968, $p < 0.05$). The implications of this study is that it would be reasonable to test a model with cross-section fixed effects as well as a model with both cross-section and period fixed effects.

4.11 Regression Model Selection

In order to select the final model for regression analysis, the study conducted regression model with several options for specification of effects according to the results of Hausman test which informs the researcher whether to use fixed effects or random effects model and likelihood ratio test of redundant fixed effects. The models were evaluated based on several criteria; R-squared (R^2), Adjusted R-squared (R^2_{adj}), Akaike info criterion (AIC), Schwarz information criterion (AIC), Hannan-Quinn criterion (HQ) and Durbin-Watson statistic (DW). The values of these evaluation statistics were weighted. The results of analysis are shown in Table 4.22.

Table 4.22: Comparison of Models

Selection criteria	Model and Statistic	
	Cross-section fixed effects	Cross-section and period fixed effect
R^2	0.913511	0.922823
R^2_{adj}	0.882464	0.879694
AIC	-7.301982	-7.230705
SIC	-6.749486	-6.494044
HQ	-7.088906	-6.946604
DW	2.085132	2.054528

Source: Author, 2020

The study carried out regression analysis using various models based on the tests of fixed effects and random effects, in order to select the most suitable model for final regression analysis. The findings indicate that the model with cross-section fixed effects is the best model in terms of information loss(AIC = -7.301982; SIC = -6.749486; HQ =-7.088906) but the second best in terms of explanatory power (R^2 = 0.913511; R^2adj = 0.882464) and residual autocorrelation (DW = 2.306589). The model with both cross-section fixed effects and period fixed effects is the best model for analysis in terms of explanatory power (R^2 = 0.922823; R^2_{adj} = 0.879694)and second best in terms of information loss (AIC = -7.230705; SIC = -6.494044; HQ = -6.946604). It is thebest modelin terms of residual autocorrelation (DW = 2.054528). However, the model with cross-section fixed effect is still considered to be appropriate based on the assumption that the residuals are independent if the Durbin Watson statistic lies between 1.5 and 2.5.The study therefore adopted the model with cross-section fixed effects for final regression analysis after examination of the model fit.

4.12 Regression Diagnostic Tests

The study conducted residual and coefficient diagnostic tests in order to assess the multiple regression model with cross-section fixed effects.

4.12.1 Residual Diagnostic Tests

Residual diagnostic tests were conducted by the study to test for residual normality, linearity, homoscedasticity and residual independence assumptions (residual cross-section dependence and residual serial correlation). In regression analysis, it is assumed that there is a linear relationship between the independent variables and the dependent variable. It is also assumed that the error terms have constant variance across all ranges of independent variables. The homoscedasticity and linearity test results using residual plots are shown in Figure 4.8.

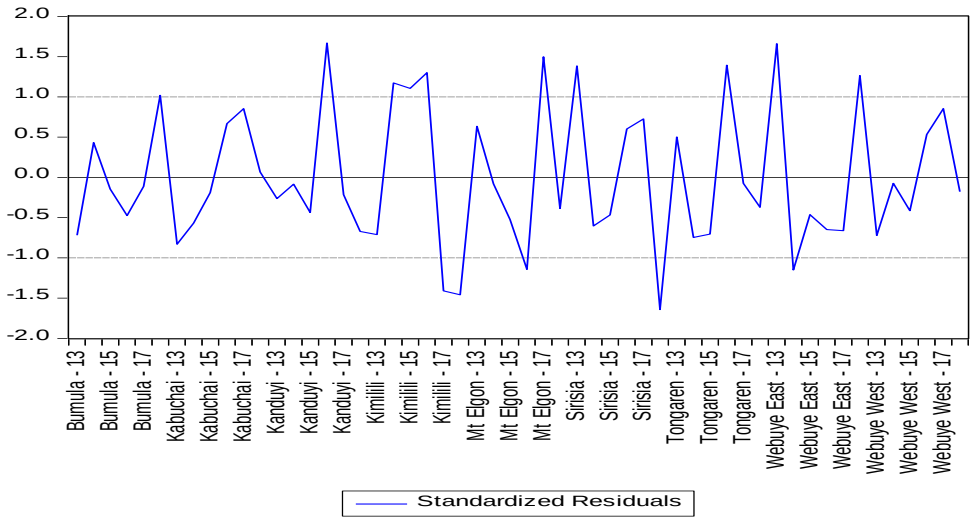

Figure 4.8: Plot of Standardized Residuals

Source: Author, 2020

The findings indicate that the residuals are randomly distributed across the entire range of the dependent variable. It is also shown that there is no visible or clear pattern for residuals. This implies that the assumptions of linearity and homoscedasticity were met.

In regression analysis, it is usually assumed that the residuals are normally distributed. The results of normality testing are shown in Table 4.23.

Table 4.23: Normality Test Results

	Value
Jarque-Bera test	2.474768
Probability	0.290142

Source: Author, 2020

According to the results of analysis, the null hypothesis that the residuals are normally distributed was not rejected (The Jarque-Bera = 2.474768; $p > 0.05$). This implies that the assumption of normal distribution of residuals was met.

The study also examined the cross-section dependence (correlation) in residuals. The results of analysis are shown in Table 4.24.

Table 4.24: Residual Cross-Section Dependence Test Results

Residual Cross-Section Dependence Test			
Null hypothesis: No cross-section dependence (correlation) in residuals			
Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	39.78179	36	0.3054
Pesaran scaled LM	0.445688		0.6558
Bias-corrected scaled LM	-0.454312		0.6496
Pesaran CD	0.051269		0.9591

Source: Author, 2020

According to the results of analysis, the study did not reject the null hypothesis that there is no cross-section dependence in residuals (Breusch-Pagan LM = 39.78179, p > 0.05; Pesaran scaled LM = 0.445688, p > 0.05; Bias-corrected scaled LM = -0.454312, p > 0.05; Pesaran CD = 0.051269, p >0.05). This implies that the assumption of independence of residuals could be assumed. Moreover, the study examined the autocorrelation of residuals to verify if the assumption of independence of residuals was met. The results are shown in Table 4.25

Table 4.25: Durbin-Watson Statistic Test Results

Statistic	Value
Durbin-Watson statistic	2.085132

Source: Author, 2020

The results indicate that the Durbin-Watson statistic was 2.085132. This value is within the required threshold of at least 1.5 and utmost 2.5 in order for the assumption of no residual autocorrelation to be met. It was therefore concluded that the assumption of residual independence was met.

4.12.2 Coefficient Diagnostic Tests

The study also examined whether the assumption of no multicollinearity was met using the variance inflation factor (VIF). The study's pertinent analysis results are depicted in Table 4.26.

Table 4.26: Variance Inflation Factor Test Results

Variance Inflation Factors

Sample: 2013 2018
Included observations: 54

Variable	Coefficient Variance	Centered VIF
FARM	9.06E-09	1.128948
INSTR	2.50E-09	1.959166
MED	3.38E-08	3.414294
STALL	9.50E-08	1.693063
ACCESS	2.54E-09	1.083146
CONN	1.66E-12	2.921380
C	0.001644	NA

Source: Author, 2020

The findings indicate that the VIF for number of farmers supported per year was 1.128948. The VIF for number of ECDE teachers and VTC instructors recruited was 1.959166. The VIF for number of medical practitioners recruited was 3.414294. The VIF for number of stalls was 1.693063. It was shown that the VIF for kilometres of access roads opened was 1.083146. The VIF for number of water connections was 2.921380. This implies that the assumption of no multicollinearity among the regressors could be assumed as all the variance inflation factors for the independent variable were less than 4. The study also conducted redundant variable test for independent variables. The results are shown in Table 4.27.

Table 4.27: Redundant Variable Test Results

Redundant Variables Test			
Null hypothesis: FARM INSTR MED STALL ACCESS CONN are jointly insignificant			
Specification: HPI FARM INSTR MED STALL ACCESS CONN C			
Redundant Variables: FARM INSTR MED STALL ACCESS CONN			
	Value	df	Probability
F-statistic	29.87117	(6, 39)	0.0000
Likelihood ratio	92.98662	6	0.0000
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	0.005620	6	0.000937
Restricted SSR	0.006844	45	0.000152
Unrestricted SSR	0.001223	39	3.14E-05
LR test summary:			
	Value	df	
Restricted LogL	165.6602	45	
Unrestricted LogL	212.1535	39	

Source: Author, 2020

According to the results of analysis, the null hypothesis that number of farmers supported per year, number of ECDE teachers and VTC instructors recruited, number of medical practitioners recruited, number of stall, kilometres of access roads opened and number of water connections are jointly insignificant in explaining human poverty index wasrejected (F-statistic = 29.87117, $p < 0.05$; Likelihood ratio = 92.98662, $p < 0.05$).The study concluded that the independent variables were significant in explaining the dependent variable. This implies that the independent variables did not have zero regression coefficients.

4.13 Panel Estimation with Cross-section Fixed Effects

The study conducted final panel regression analysis using a model with cross-sectionfixed effects in order to examine the effect of devolution of government functions on economic development in Bungoma county, Kenya.The independent variable

werenumber of farmers supported per year (FARM), number of ECDE teachers and VTC instructors recruited (INSTR), number of medical practitioners recruited (MED), number of stalls (STALL), kilometres of access roads opened (ACCESS) and number of water connections (CONN) while the dependent variable washuman poverty index (HPI) in Bungoma county, Kenya.

The multiple regression model was evaluated to assess its fit for the data. The study's pertinent analysis results are depicted in Table 4.28.

Table 4.28: Evaluating the Fit of the Multiple Regression Model

Dependent Variable: HPI	
Method: Panel Least Squares	
R-squared	0.913511
Adjusted R-squared	0.882464
F-statistic	29.42329
Prob(F-statistic)	0.000000

Source: Author, 2020

The results indicate that devolution of government functions has a strong relationship with economic development in Bungoma County, Kenya (R-squared = 0.913511). It was noted that 88.24% of changes in human poverty indexin Bungoma county can be explained by number of farmers supported per year, number of ECDE teachers and VTC instructors recruited, number of medical practitioners recruited, number of stalls, kilometres of access roads opened and number of water connections (Adjusted R-squared = 0.882464). It was also noted that the model adopted by the study was statistically significant. This implies that not all independent variables have zero

regression coefficients (F-statistic = 29.42329, $p < 0.05$). The study's pertinent analysis results are depicted in Table 4.29.

Table 4.29: Results of Multiple Regression Analysis

Dependent Variable: HPI				
Method: Panel Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FARM	-0.000100	8.01E-05	-1.249017	0.2191
INSTR	-2.63E-05	2.15E-05	-1.225011	0.2279
MED	0.000209	0.000180	1.162878	0.2519
STALL	-0.000812	0.000298	-2.724187	*0.0096
ACCESS	-3.86E-05	3.56E-05	-1.082636	0.2856
CONN	1.04E-06	1.29E-06	0.805711	0.4253
C	0.235797	0.033314	7.077974	0.0000

Source: Author, 2020

4.14 Hypothesis Testing

The results of the hypothesis testing are discussed in this section.

4.14.1 H_{O1}: Devolution of agriculture function has no significant effect on economic development in Bungoma County, Kenya

The findings indicate that number of farmers supported per year has a negative but insignificant effect on human poverty index in Bungoma county, Kenya (β_1 = -0.000100, $p > 0.05$).The null hypothesis thatdevolution of agriculture function has no significant effect on economic development in Bungoma County, Kenya was not rejected ($p > 0.05$). This implies that the devolution of agriculture function positively and insignificantly affects economic development in Bungoma county, Kenya (β_1 = -5.40E-05, $p > 0.05$). The insignificant effect tends to agree with the results of a study by Cornell and D'Arcy (2016) which revealed that little has been achieved in terms of economic development since the onset of devolution in Kenya. The findings also tend to concur with findings of studies by Diao (2010), Matthew and Mordecai (2016) as well as

Omorogiuwa, Zivkovic and Ademoh (2014) that agriculture plays a role in poverty reduction and enhancingeconomic development.

4.14.2 H_{O2}: Devolution of education function has no significant effect on economic development in Bungoma County, Kenya

It was found out that the number of ECDE teachers and VTC instructors recruited negatively and insignificantly affects human poverty index in Bungoma county, Kenya (β_2= -2.63E-05, $p > 0.05$).The null hypothesis that devolution of education function has no significant effect on economic development in Bungoma County, Kenya was not rejected ($p > 0.05$). This implies that the devolution of education function positively and insignificantly affects economic development in Bungoma county, Kenya (β_2 = -4.14E-05, $p > 0.05$). The insignificant effect tends to agree with the results of a study by Cornell and D'Arcy (2016) which revealed that little has been achieved in terms of economic development since the onset of devolution in Kenya. These findings concur with findings of a study by Sentao Consulting (2017) which noted that education remains one of the key drivers of poverty alleviation and economic development. These findings agree with results of a study by Gyimah-Brempong (2010) which noted positive effect of education on economic development in 52 African countries. The findings are also similar to the findings of a study by The International Institute for Applied Systems Analysis (2008) which noted that economic development in Ethiopia, Kenya and Nigeria relies on the education of the citizens.

4.14.3 H_{O3}: Devolution of health function has no significant effect on economic development in Bungoma County, Kenya

It was noted that the number of medical practitioners recruitedpositively and insignificantly affects human poverty index in Bungoma county, Kenya ($\beta_3 = 0.000209$, $p > 0.05$).The null hypothesis thatdevolution of health function has no significant effect on economic development in Bungoma County, Kenya was not rejected ($p > 0.05$). This implies that the devolution of health function negatively and insignificantly affects economic development in Bungoma county, Kenya ($\beta_3 = 0.000209$, $p > 0.05$). The insignificant effect tends to agree with the results of a study by Cornell and D'Arcy (2016) which revealed that little has been achieved in terms of economic development since the onset of devolution in Kenya. The findings disagree with findings of a study by Stevens et al. (2015) which established that improvement of health positively impacts on welfare of individuals and income. The difference in findings could be due to the reason that as the government hires more medical practitioners, they may not have direct impact on improving people's living standards perhaps due to such factors as focus on private business and disgruntlement with poor pay. This is evidenced by strikes that were witnessed in Kenya and the general state of health services in public hospitals visa vis private hospitals in Kenya.

4.14.4 H_{O4}: Devolution of trade function has no significant effect on economic development in Bungoma County, Kenya

It was noted that the number of stalls negatively and significantly affects human poverty index in Bungoma county, Kenya (β_4= -0.000812, $p < 0.05$).The null hypothesis that devolution of trade function has no significant effect on economic development in Bungoma County, Kenya was rejected ($p < 0.05$). This implies that the devolution of trade function positively and significantly affects economic development in Bungoma county, Kenya (β_4 = -0.000812, $p < 0.05$). It is also implied that increasing devolution of trade function by 1 unit leads to enhanced economic development in Bungoma county, Kenya by 0.000812 unit.The findings concurswith the findings of studies by Busse and Koniger (2012), Adeleye et al. (2015), Sun and Heshmati (2010) and Hussain and Haque (2016) which determined that trade positively impacts on growth of the economy.

4.14.5 H_{O5}: Devolution of transport function has no significant effect on economic development in Bungoma County, Kenya

The study determined that the kilometres of access roads openednegatively and insignificantly affects human poverty index in Bungoma county, Kenya (β_5 = -3.86E-05, $p > 0.05$).The null hypothesis that devolution of transport function has no significant effect on economic development in Bungoma County, Kenya was not rejected ($p > 0.05$). This implies that the devolution of transport function positively and insignificantly affects economic development in Bungoma county, Kenya (β_5 = -3.86E-05, $p > 0.05$).These findings concur with findings of studies by Nazemzadeh et al.

(2015), Kayode et al. (2013), Ismail and Mahyideen (2015) and Alder (2014)which noted that investment in transport positively affects economic development.

4.14.6 H_{O6}: Devolution of water function has no significant effect on economic development in Bungoma County, Kenya

The study established that the number of water connectionspositively and insignificantly affects human poverty index in Bungoma county, Kenya (β_6 = 1.04E-06, p > 0.05).The null hypothesis thatdevolution of water function has no significant effect on economic development in Bungoma County, Kenya was not rejected (p > 0.05). This implies that the devolution of water function negatively and insignificantly affects economic development in Bungoma county, Kenya (β_6 = 1.04E-06, p > 0.05).These findings contradict with findings of studies by Tir et al. (2014), Fogden (2009) and Manase (2009) which noted that investment in water positively affects economic development. The reasons for contradictory findings could be the manner in which the water variable was measured and the different contexts of the studies. Moreover, it could be too early to judge the effect that devolution of water function has on economic development as the long-run effect could be positive.Some counties have taken off at a relative disadvantage and it may take time to build up their capacity and ability to use resources well (Khaunya et al., 2015).

Based on the results of analysis, it was implied that only the devolution of trade function was significant in explaining economic development in Bungoma county, Kenya. From the results of multiple regression analysis, it is implied that in the final estimation

equation, only devolution of trade function and the constant would be included as they were statistically significant ($p < 0.05$). These results can be explained by the multiple regression model in Equation 4.1.

HPI = 0.235797 - 0.000812β_4..... Equation 4.1

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview of the Chapter

The chapter outlines the summary of research findings, the conclusions drawn from the study and the recommendations.

5.1 Summary of Findings

Summary of findings for devolution of agriculture, education, health, trade, transport and water functions is provided.

5.1.1 Effect of Devolution of Agriculture Function on Economic Development in Bungoma County, Kenya

The findings indicate that there was a general rise in the number of farmers supported per year in each of the nine sub-counties in Bungoma county between 2013 and 2018. It was noted that the number of farmers supported per year and human poverty index negatively and significantly covary. It was found out that the number of farmers supported per year and human poverty index negatively covary in the long-run. It was shown that the number of farmers supported per year and human poverty index correlate negatively and significantly. The relationship between the two variables is strong. The study determined that there is significant correlation at sub-county level for the devolved agriculture function in Bungoma county, Kenya. It was noted that the number of farmers supported per year does not granger cause human poverty index but human poverty index granger causes the number of farmers supported per year. The study established

that the devolution of agriculture function positively and insignificantly affects economic development in Bungoma county, Kenya.

5.1.2 Effect of Devolution of Education Function on Economic Development in Bungoma County, Kenya

The study established that there was a general rise in the number of ECDE teachers and VTC instructors recruited in each of the nine sub-counties in Bungoma county between 2013 and 2018. It was found out that the number of ECDE teachers and VTC instructors recruited and human poverty index negatively and significantly covary. It was noted that the number of ECDE teachers and VTC instructors recruited and human poverty index negatively covary in the long-run. The study determined that the number of ECDE teachers and VTC instructors recruited and human poverty index correlate negatively and significantly. The relationship between the two variables is strong. The study determined that there is significant correlation at sub-county level for the devolved education function in Bungoma county, Kenya. It was found out that the number of ECDE teachers and VTC instructors recruited does not granger cause human poverty index and human poverty index does not granger cause the number of ECDE teachers and VTC instructors recruited. It was found out that devolution of education function positively and insignificantly affects economic development in Bungoma county, Kenya.

5.1.3 Effect of Devolution of Health Function on Economic Development in Bungoma County, Kenya

The study determined that there was a general rise in the number of medical practitioners recruited in each of the nine sub-counties in Bungoma county between 2013 and 2018. It was revealed that the number of medical practitioners recruited and human poverty index negatively and significantly covary. It was also revealed that the number of medical practitioners recruited and human poverty index negatively covary in the long-run. The study determined that the number of medical practitioners recruited and human poverty index correlate negatively and significantly. The relationship between the two variables is strong. Itwas established that there is significant correlation at sub-county level for the devolved health function in Bungoma county, Kenya. It was noted that the number of medical practitioners recruited does not granger cause human poverty index and human poverty index does not granger cause the number of medical practitioners recruited. It was determined that the devolution of health function negatively and insignificantly affects economic development in Bungoma county, Kenya.

5.1.4 Effect of Devolution of Trade Function on Economic Development in Bungoma County, Kenya

It was found out that there was a general rise in the number of stalls in each of the nine sub-counties in Bungoma county between 2013 and 2018. It was shown that the number of stalls and human poverty index negatively and significantly covary. It was also shown

that the number of stalls and human poverty index negatively covary in the long-run. The study determined that the number of stalls and human poverty index correlate negatively and significantly. The relationship between the two variables is strong. It was noted that there is significant correlation at sub-county level for the devolved trade function in Bungoma county, Kenya. It was noted that the number of stalls granger causes human poverty index and human poverty index does not granger cause the number of stalls. The study established that the devolution of trade function positively and significantly affects economic development in Bungoma county, Kenya.

5.1.5 Effect of Devolution of Transport Function on Economic Development in Bungoma County, Kenya

The study determined that there was a general rise in the kilometres of access roads opened in each of the nine sub-counties in Bungoma county between 2013 and 2018. It was noted that kilometres of access roads opened and human poverty index negatively and significantly covary. The study also noted that kilometres of access roads opened and human poverty index negatively covary in the long-run. It was shown that kilometres of access roads opened and human poverty index correlate negatively and significantly. The relationship between the two variables is strong. The study determined that there is significant correlation at sub-county level for the devolved transport function in Bungoma county, Kenya. It was determined that kilometres of access roads opened does not granger cause human poverty index and human poverty index does not granger cause kilometres of access roads opened. It was established that the devolution

of transport function positively and insignificantly affects economic development in Bungoma county, Kenya.

5.1.6 Effect of Devolution of Water Function on Economic Development in Bungoma County, Kenya

It was determined that there was a general rise in the number of water connections in each of the nine sub-counties in Bungoma county between 2013 and 2018. It was found out that the number of water connections and human poverty index negatively and significantly covary. It was also found out that the number of water connections and human poverty index negatively covary in the long-run. The study established that the number of water connections and human poverty index correlate negatively and significantly. The relationship between the two variables is strong. It was determined that there is significant correlation at sub-county level for the devolved water function in Bungoma county, Kenya. It was noted that the number of water connections does not granger cause human poverty index and human poverty index does not granger cause the number of water connections. The study established that the devolution of water function negatively and insignificantly affects economic development in Bungoma county, Kenya.

5.1.7 Human poverty index in Bungoma County, Kenya

The findings indicate that the maximum annual human poverty index in the nine sub counties in Bungoma county, Kenya between 2013 and 2018, was 0.261000. The minimum annual human poverty index was 0.187000. On average, it was noted that the

annual human poverty index for the 54 observations was 0.229944, with a standard deviation of 0.016334. It was determined that there was a general decline in the annual human poverty index in each of the nine sub-counties in Bungoma county between 2013 and 2018. It was found out that there is significant correlation at sub-county level in the human poverty index in Bungoma county, Kenya.

5.2 Conclusions

The study concluded that devolution of government functions has a strong relationship with economic development in Bungoma County, Kenya. It was concluded that devolution of agriculture function positively and insignificantly affects economic development in Bungoma county, Kenya. The study concluded that devolution of education function positively and insignificantly affects economic development in Bungoma county, Kenya. It was also concluded that devolution of health function negatively and insignificantly affects economic development in Bungoma county, Kenya. It was concluded that the devolution of trade function positively and significantly affects economic development in Bungoma county, Kenya. The study concluded that the devolution of transport function positively and insignificantly affects economic development in Bungoma county, Kenya. It was concluded that the devolution of water function negatively and insignificantly affects economic development in Bungoma county, Kenya.

5.3 Recommendations and Policy Implications

This study recommends that the government should strengthen devolution by allocating more funds to county governments than is currently being done. This is expected to lead

to enhanced economic development in the long run. This will ensure that more funds are available to strengthen various devolved functions such as agriculture, education, health, trade, transport and water in order to enhance economic development significantly.

To the government and policy makers, this study recommends that the devolved functions of county governments should be well coordinated and the process of budget development and resource allocation should involve the citizens. This will ensure that the county governments undertake projects which the citizens give priority and are considered to be of great benefits in terms of socio-economic welfare.

5.4 Areas for Further Research

This study recommends that future researchers should focus on other devolved functions not focused on in this study and the effects that the functions have on economic development. Studies on the effects of devolved functions on economic development which considers more than one county should also be conducted because the results of a single county may not be generalizable to other counties; a study on all counties in Kenya would be most appropriate as it would give a wide picture of the effect of entire system of devolution in Kenya on economic development.

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APPENDICES

Appendix I: Letter of Introduction

Dear Sir/Madam,

RE: LETTER OF INTRODUCTION – MABONGA WEKESA MARTIN – SBE/PGE/001/14

I am a postgraduate student undertaking Master of Arts in Economics at Moi University in the Department of Economics, School of Business and Economics. The title of my research is*"**EFFECT OFDEVOLVED SYSTEM OF GOVERNANCE ON ECONOMIC DEVELOPMENT IN BUNGOMA COUNTY, KENYA**".*You arekindly requested to provide the required data by filling in the attached data collection sheet. The information is purely for academic purpose.If you would like, we could send you the executive summary of the findings on request. Thank you.

Yours sincerely

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MabongaWekesa Martin
Student, Moi University

Appendix II:Secondary Data Sheet

This data sheet is intended to gather information for an academic study entitled "effect of devolved system of governance on economic development in Bungoma county, Kenya". The data collected is purely for academic and any information given will be handled confidentially. You are humbly requested to provide data onhuman poverty index (HPI), number of farmers supported per year (FARM), number of ECDE teachers and VTC instructors recruited (INSTR), number of medical practitioners recruited (MED), number of stalls (STALL), kilometres of access roads opened (ACCESS) and number of water connections (CONN) by filling in the table below.

Sub County-year	HPI	FARM	INSTR	MED	STALL	ACCESS	CONN
Bumula - 2013							
Bumula - 2014							
Bumula - 2015							
Bumula - 2016							
Bumula - 2017							
Bumula - 2018							
Kabuchai - 2013							
Kabuchai - 2014							
Kabuchai - 2015							
Kabuchai - 2016							
Kabuchai - 2017							
Kabuchai - 2018							
Kanduyi - 2013							
Kanduyi - 2014							
Kanduyi - 2015							
Kanduyi - 2016							
Kanduyi - 2017							
Kanduyi - 2018							
Kimilili - 2013							
Kimilili - 2014							
Kimilili - 2015							
Kimilili - 2016							
Kimilili -2017							
Kimilili - 2018							
Mt Elgon -2013							
Mt Elgon - 2014							
Mt Elgon - 2015							
Mt Elgon - 2016							

Sub County-year	HPI	FARM	INSTR	MED	STALL	ACCESS	CONN
Mt Elgon - 2017							
Mt Elgon - 2018							
Sirisia - 2013							
Sirisia - 2014							
Sirisia - 2015							
Sirisia - 2016							
Sirisia - 2017							
Sirisia - 2018							
Tongaren -2013							
Tongaren - 2014							
Tongaren - 2015							
Tongaren - 2016							
Tongaren - 2017							
Tongaren - 2018							
Webuye East - 2013							
Webuye East - 2014							
Webuye East - 2015							
Webuye East - 2016							
Webuye East - 2017							
Webuye East - 2018							
Webuye West - 2013							
Webuye West - 2014							
Webuye West - 2015							
Webuye West - 2016							
Webuye West - 2017							
Webuye West - 2018							

Appendix III: The Panel Data for Bungoma County

Sub County-year	HPI	FARM	INSTR	MED	STALL	ACCESS	CONN
Bumula - 2013	0.256	102	339	129	9	29	328
Bumula - 2014	0.259	127	369	134	9	62	401
Bumula - 2015	0.249	118	598	145	12	107	611
Bumula - 2016	0.241	139	611	149	15	167	804
Bumula - 2017	0.232	162	642	151	24	204	1196
Bumula - 2018	0.239	155	667	159	24	236	1369
Kabuchai - 2013	0.234	108	182	197	8	23	1769
Kabuchai - 2014	0.231	143	216	199	8	39	1894
Kabuchai - 2015	0.225	163	344	208	12	81	2126
Kabuchai - 2016	0.23	157	362	214	12	116	2278
Kabuchai - 2017	0.223	169	388	216	18	169	2617
Kabuchai - 2018	0.218	175	419	223	18	194	2922
Kanduyi - 2013	0.214	232	375	442	29	42	4096
Kanduyi - 2014	0.21	246	407	451	34	93	5427
Kanduyi - 2015	0.206	252	652	498	40	141	7246
Kanduyi - 2016	0.209	245	673	512	55	194	9523
Kanduyi - 2017	0.194	254	703	514	60	230	11706
Kanduyi - 2018	0.187	294	755	519	60	293	13931
Kimilili - 2013	0.245	114	187	103	16	24	1349
Kimilili - 2014	0.251	141	216	106	16	72	1485
Kimilili - 2015	0.243	130	374	115	22	118	1674
Kimilili - 2016	0.237	152	392	121	27	164	1829
Kimilili -2017	0.214	164	426	124	32	231	2101
Kimilili - 2018	0.201	192	463	126	42	271	2383
Mt Elgon -2013	0.261	204	281	114	14	51	1032
Mt Elgon - 2014	0.254	213	297	118	14	124	1326
Mt Elgon - 2015	0.247	206	412	131	18	176	1644
Mt Elgon - 2016	0.232	221	458	132	27	233	2108
Mt Elgon - 2017	0.241	232	475	138	32	281	2509
Mt Elgon - 2018	0.226	247	501	139	34	312	2841
Sirisia - 2013	0.257	152	141	204	12	15	415
Sirisia - 2014	0.242	157	172	217	17	52	618
Sirisia - 2015	0.234	174	346	223	20	93	886
Sirisia - 2016	0.238	178	364	225	20	137	1054
Sirisia - 2017	0.229	186	392	234	30	194	1316
Sirisia - 2018	0.211	196	432	241	34	223	1519
Tongaren -2013	0.241	166	286	137	11	36	625
Tongaren - 2014	0.232	171	305	143	11	98	733
Tongaren - 2015	0.224	176	461	147	14	155	905
Tongaren - 2016	0.229	202	487	154	19	186	1215
Tongaren - 2017	0.218	214	506	157	19	236	1424
Tongaren - 2018	0.21	227	536	164	25	263	1627
Webuye East - 2013	0.245	137	140	94	10	25	1284
Webuye East - 2014	0.231	134	169	109	10	53	1409
Webuye East - 2015	0.228	143	334	119	13	89	1526
Webuye East - 2016	0.224	158	358	122	13	138	1943
Webuye East - 2017	0.216	193	384	131	18	187	2258
Webuye East - 2018	0.219	184	416	135	23	316	2609

Sub County-year	HPI	FARM	INSTR	MED	STALL	ACCESS	CONN
Webuye West - 2013	0.241	126	178	286	18	33	1528
Webuye West - 2014	0.239	142	194	296	23	79	1674
Webuye West - 2015	0.233	140	344	298	23	103	1814
Webuye West - 2016	0.227	164	356	303	33	154	2255
Webuye West - 2017	0.224	174	389	313	38	193	2789
Webuye West - 2018	0.216	198	424	325	38	234	2942

Appendix IV: Sub Counties and Wards in Bungoma County

Sub County	**County Assembly Wards**	**No. of County Assembly Wards**
Kanduyi	Bukembe West, Bukembe East, Township, Khalaba, Musikoma, East Sang'alo, Tuuti/Marakaru, West Sang'alo	8
Bumula	South Bukusu, Bumula, Khasoko, Kabula, Kimaeti, West Bukusu, Siboti	7
Webuye East	Mihuu, Ndivisi, Maraka	3
Webuye West	Sitikho, Matulo, Bokoli, Misikhu	4
Kabuchai	Kabuchai/Chwele, West Nalondo, Bwake/Luuya, Mukuyuni	4
Sirisia	Namwela, Malakisi/South Kulisiru, Lwandanyi	3
Tongaren	Mbakalo, Naitiri/Kabuyefwe, Milima, Ndalu/Tabani, Tongaren/Kiminini, Soysambu/Mitua	6
Kimilili	Kibingei, Kimilili, Maeni, Kamukuywa	4
Mt Elgon	Cheptais, Chesikaki, Chepyuk, Kapkateny, Kaptama, Elgon	6
Total		45

Source:*IEBC (2012), Final Report.*