EFFECTS OF DEVOLUTION ON TECHNICAL EFFICIENCY OF HEALTHCARE SERVICES DELIVERY IN BOMET COUNTY, KENYA

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN HEALTH MANAGEMENT IN THE SCHOOL OF PUBLIC HEALTH OF KENYATTA UNIVERSITY.

OCTOBER, 2018
DECLARATION

This thesis is my original work and has not been presented for the award of any degree in any other university.

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DEDICATION

Dedicated to Dad, Mum and my Siblings Ray, Kim, Mercy and Faith for their unwavering support in every step towards the success of this work. Thanks to the Almighty God for them and the strength to accomplish this.
ACKNOWLEDGMENT

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God bless you all.
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Devolution has been seen by its proponents as a way of improving access and efficiency in the delivery of services to the people since the decisions are made close to the people, hence decision makers are more accountable to them. With the onset of Kenya’s devolution in March 2013 as provided for in the Constitution of Kenya of 2010, healthcare resources have been at the dispensation of the counties together with all the devolved functions. However, there is no assurance of any efficiency gains brought about by this phenomenon in the health sector as alluded by the devolution literature. Therefore, determining the current efficiency levels in the devolved units (counties) and comparing them with the levels before devolution onset brings out a picture on the extent these reform affects efficiency. The broad objective of this study was to assess the effects of devolution of healthcare on the technical efficiency of healthcare services delivery in Bomet County, Kenya. A cross-sectional study design was used where secondary and quantitative data was collected using a data checklist from the ministry of health and the county’s information platforms. ‘Ex-ante’ and ‘ex-post’ data from the devolution periods were used to calculate the technical efficiencies using a non-parametric econometric technique, Data Envelopment Analysis (DEA). Key informant interviews were done after analyses of data to get the views of the county’s health managers on the results. The findings indicated that there was an increase in the number of hospitals in the county from 3 before devolving healthcare to 8 in 2015. The number of primary healthcare facilities too increased from 109 to 132. The staff numbers show 87.2% increase from 553 in 2012 to 1035 by 2015. Staff changes also saw employment of new specialists to the county government who were not there before devolution. The mean constant returns to scale technical efficiency (CRS TE) scores for the county increased from 92.4% in 2012 to 96.1% in 2015, while the varied returns to scale technical efficiency (VRS TE) score showed an increase of 3.4% from 96.6% to 100%. The county mean scale efficiency scores increased from 95.7% before devolution to 96.1% after devolution. It therefore indicates a general increase in technical efficiency from the period before devolution to the period after devolution. For the county to realize efficiency, the health outputs should be increased rather than cut down on investments, thus the need for monitoring and evaluation to meet the output targets and the creation of demand for the public healthcare services through improving on the quality of services and increased involvement of the community units.
1 CHAPTER ONE: INTRODUCTION

1.1 Background of the study

The Constitution of Kenya (2010) provides for devolution of health services, which implies that service provision and management is now primarily a function of the counties and functions of stewardship for the health policy including standards and guidelines left with the national government (KHSSP 2014-2018, 2014). Devolution is a form of decentralization that involves the transfer of authority from the central government to smaller legally constituted autonomous units. Functions and resources are assigned to both levels of government where they coordinate and not subordinate to each other (Murkomen, 2012).

Devolution has been seen by its proponents as a way of improving the access and efficiency in the delivery of services to the people since the decisions are made close to the people hence decision makers are more accountable to them (World Bank, 2012). Efficiency in healthcare provision is the relationship between a specific product of the health care system (output) and the resources used to create that product (inputs), thus involves the maximizing of output for a given set of inputs or minimizing inputs used to produce a given output (Hussey et al., 2009).

Since March 2013, healthcare services have largely been under the county governments with a lot of streamlining in the sector to fit in to the new system. The Transition Authority (TA), which was tasked with overseeing the smooth transfer of devolved functions to the counties and their coordination, stipulates the functions of each level of government and the unbundled functions which are a responsibility of both levels. The national government is in charge of the two national referral hospitals (KNH & MTRH), the two special hospitals (Spinal Injury and Mathari Mental hospitals), the
Semi-Autonomous Government Agencies (SAGA’s) and policy and strategy formulation and implementation. The counties on the other hand are in charge of all county health facilities including the county referral hospitals all the way to the community units, in terms of health service provision and promotion. Ambulatory and emergency services also fall within the counties, so as public health functions.

The two levels however share the responsibilities in legislation, health financing (resource mobilization, policy and regulation), financial management, planning and budgeting, quarantine administration, disease prevention & control (policy & coordination); including surveillance, partnerships; including public and private, intergovernmental relations, procurement of health products and technologies, human resources management and development, monitoring and evaluation, health research (regulation and implementation) and health information systems. Infrastructural and process changes have been seen since the new system started operating, with differences in the change indicators in different counties according to The Annual Health Sector Performance Report (AHSPR), July 2013 – June 2014 from the Ministry of Health.

Though it is still a new concept in the Kenyan health system, global devolution literature spells a lot on its implementation and advocacy as a system to improve healthcare efficiency, but little has been done to ascertain the real efficiency gains of devolution. The few technical efficiency studies done in Kenya (Kirigia, et. al., 2002 & Kirigia, et. al., 2004) used Data Envelopment Analysis to measure the relative technical efficiencies. The studies respectively showed that 74% of the public hospitals sampled were operating efficiently, a technical efficiency score of 100%, while among the sampled health centers, 56% were found to be efficient. These studies were carried out
almost a decade before devolution was rolled out in the country.

The Health Sector Analytical Report 2013-2014 by the Ministry of Health is a more recent study which has an aspect of technical efficiency in it. The report estimates that the country average technical efficiency stands at 56.43%, a mean value of the relative technical efficiencies of the 47 counties. The analytic report is the first of its kind by the ministry of health, though it does not look into the devolution effects on this performance indicator.

The Millennium Development Goals (MDG’s) which were central to the health sector proved a challenge to meet by most countries in sub-Saharan Africa, Kenya included. A look at goal number 5 on maternal health for example, shows that improvements were realized in reducing maternal deaths as shown in figure 1.1 below, but not by 75% as was the target.

Source: KDHS 2015

**Figure 1.1: Trends in maternal mortality ratio from 2000 to 2013**
The World Health Organization termed the progress by Kenya in realizing the goal on maternal mortality as insufficient. This is despite the enormous resources that were dedicated to realize this goal among others when countries were committing at the 2000 millennium summit (WHO, 2014), which can point to inefficiency in their use.

The National Health Accounts (NHA) 2012/2013 (GOK, 2015) showed, in their findings, a general increase in government expenditure on health as a percentage of total government expenditure from 4.6% in 2009/10 to 6.1% in 2012/13. The Total Health Expenditure (THE) increased from Kshs 163 billion in 2009/10 to Kshs 234 billion in 2012/13. Total health spending accounted for 6.8% of GDP up from 5.4% in 2009/10. Despite these increase in health care allocations and spending, little improvements have been seen in terms of health indicators, according to Health Sector Working Group report (2012). This may imply that these resources may not have been efficiently utilized to improve on the health outcomes. Devolution came into practice at almost the closing period of the report. This study therefore came in handy to ascertain whether there are any efficiency gains after devolution in Bomet County, with analysis of the changes in the healthcare investments against the changes in the outcome indicators.

1.2 Statement of the Problem

With the onset of Kenya’s devolution in March 2013 as provided for in the Constitution of Kenya (2010), healthcare resources have been at the dispensation of the counties together with all the devolved functions. However, there is no assurance of any efficiency gains brought about by this phenomenon in the health sector as alluded by the devolution literature.
There have been numerous industrial actions by the healthcare workers through their unions agitating for recentralization of the health sector. The year 2014 saw 800 doctors resign from civil service according to the Kenya Medical Practitioners and Dentists Union (KMPDU). A bill was once tabled in Kenya’s parliament that wanted the health sector to be taken back to the national government. These events denote problems in the devolved health sector that need attention.

Notably, Bomet county healthcare workers did not participate in the 2014 strikes according to the Ministry of health. The Council of Governors also in their report of 2014 placed Bomet county in second place in terms healthcare service delivery among the counties. However, the Health Sector Analysis Report (2013-2014) shows its relative efficiency as below average (43.1%). These seemingly differential results make Bomet county an area of interest.

Goals of the health sector will only be realized if the scarce healthcare resources are properly utilized to realize greater efficiencies. Obtaining and putting into best use of the scarce health resources is an essential function of the health system (WHO, 2000).

Inputs into the health sector by the various counties produced different output levels with some proving much technically efficient in health provision than others (Health Sector Analysis Report 2013-2014). More calls have been made by leaders to increase the funding to the counties for improved service provision while others feel the counties are not doing enough with what they already have.

The Health Service Assessment Report (GOK, 2014) cited challenges in county health systems with financial resources in particular proving to be most challenging to manage by the devolved governments with no clear guidelines on its management. Facility Improvement Funds (FIF) which are supposed to be ploughed back to the facility 100%
were on average only ploughed back to 90.4%. Requirement of some facilities to deposit FIF in a common account by county governments resulted to less or more funds than collected being re-invested for development.

In devolution literature, while the focus is on implementation of decentralization policies due to perceived benefits available in blueprints and country experiences, it is worth noting that recentralization by previously devolved countries citing efficiency as one reason to recentralize (Saltman, et.al., 2007) calls for analyses of devolved systems and their efficiency gains. While broad studies and assessments have been taken by the ministry of health to gauge the progress in attaining the health sector goals due to the health sector reforms including devolution, it proved difficult to access a specific study that has been done to ascertain how devolution affects the efficiency of health care provision in counties. This study therefore sought to fill this gap by determining the effects of devolution on healthcare efficiency in Bomet County-Kenya, through comparing the relative technical efficiencies of the county’s health system before and after devolution.

1.3 Study justification

While carrying out the study on Allocative efficiency in reference to decentralized public health sector in Uganda, Strumpf, et.al (2001) acknowledged the scant attention to efficiency in health economics literature. Apart from the Health Sector Analysis Report 2013-2014 by the ministry of health which has an aspect of efficiency in the counties, no known study could be accessed analyzing efficiency within counties in Kenya, more so comparing before and after devolution.
The Health Sector Analysis Report (2013-2014) recommends that the health sector ought to keenly focus on efficiency improvements in how the available resources are utilized, with emphasis on counties. The recentralizing trends in previously devolved healthcare systems of the likes of Norway citing inefficiencies (Saltman et.al 2007) also call for efficiency analyses in devolving and devolved healthcare system and Kenya is no exception. Policy makers in Kenya need the information on efficiency performance as a result of devolution to inform their decisions in addressing challenges that arise on implementing devolution policies. The information currently is scant and not readily available.

1.4 Research questions

i) What are the technical efficiency levels of the county before and after devolution?

ii) What are the returns to scale of health production in Bomet county before and after devolution?

iii) What changes have occurred in the number of hospitals and functional primary care facilities in the county since devolution of health services rolled out?

iv) Which changes in healthcare human resource composition and numbers have taken place due to devolution?

1.5 Objectives

1.5.1 Main Objective

The general objective of this study was to assess the effects of devolution of health services on the technical efficiency of delivery of healthcare in Bomet County, Kenya.
1.5.2 Specific objectives

This study addressed four specific objectives:

i) To determine the levels of technical efficiency changes in Bomet county before and after devolution.

ii) To determine the returns to scale of health production in Bomet county before and after devolution.

iii) To establish the change in the number of hospitals and functional primary healthcare facilities occurring after devolution.

iv) To ascertain the human resources for health numbers and composition changes that have been done since devolution took place.

1.6 Conceptual model

The figure 1.2 below illustrates the relationship between the independent variables (inputs) which are combined in the production function to yield the outputs, and how they influence the efficiency score (dependent variable).
This study generated information that paint a picture of how implementation of devolution policies in the county’s health sector has affected its efficiency, comparing the state before devolution and two years down the line. The health managers and stakeholders can therefore use the information to make changes to improve the health sector. The findings also form a baseline in analyses in the devolved units to get the real picture of devolving health services in the country and therefore impart on the decision making regarding health sector efficiency and the changes needed in resource allocation and use to achieve optimal health production.

**1.7 Significance of the study**
CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter encompasses devolution and efficiency literature in two parts, the theoretical literature and the empirical literature. The concepts, experiences and reviews on decentralization of health services and the efficiency concerns are covered in the theoretical literature while empirical literature reviews the past empirical studies that have been carried out concerning devolution/decentralization of healthcare and the effects on efficiency of healthcare production. The summary of literature review will be the emerging issues and gaps as per the review.

2.1 Theoretical literature

2.1.1 Devolution and efficiency

Devolution is a form of decentralization that involves the transfer of authority from the central government to smaller legally constituted bodies. The smaller lower level units are autonomous; hence the central government has no direct control over their activities. Functions and resources are assigned to both levels of government where they coordinate and not subordinate to each other (Murkomen, 2012).

However, Sherwood (1969) argues devolution has a concept of separateness therefore quite separate from decentralization. Functions are divested by the central government to created units of governance where the central government has no direct control. The argument he and others have is that decentralization and devolution are different phenomena: where decentralization is used within an organization while devolution is used between organizations i.e. national and devolved units (Sherwood, 1969). This review nonetheless uses decentralization and devolution interchangeably based on the
concept of moving health services decisions closer to the people. Health services are among the functions devolved to counties in Kenya with the national government remaining with stewardship and oversight authority as stipulated in schedule IV of Constitution of Kenya (2010).

Efficiency in healthcare provision is the relationship between a specific product of the health care system (output) and the resources used to create that product (inputs). The health system would be efficient if it was able to maximize output for a given set of inputs or to minimize inputs used to produce a given output (Hussey, et al., 2009). Allocative efficiency concerns provision of public health goods and services to the public which the benefits accrue to a larger population rather than private goods and services where benefits go to individuals (Schwartz, Guilkey and Racelis, 2002).

Technical efficiency on the other hand refers to the ability to transform healthcare resources into health services in the most productive way, combining inputs so as to achieve the maximal output without wastage or over-use of inputs, for example, appropriate staffing levels, regular drugs supply, and equipment necessary for a health facility’s case mix. Economic efficiency is concerned with operating in the most productive manner with the lowest input costs, e.g., generic drug use (Hutchinson and LaFond, 2004). It is worth noting that the production process in healthcare is complex, therefore measuring efficiency is difficult. The output is the health status of the population being served, which renders it quite difficult to measure (O’Neilla, et al., 2008). The various determinants of health to the population including the socio-economic and environmental factors are exogenous to the health production process in the health sector, therefore difficult to quantify in the production equations.
Decentralization has been advocated for in developing countries for decades by health sector reform advocates with the view as an administrative reform possible for efficiency and quality improvements, promotion of democracy and accountability to the local population (Bossert 1998). Decentralization is based on the idea that properly structured and steered smaller organizations are more agile and accountable than larger organizations (Saltman, et.al., 2007). Even Max Weber, the German sociologist famed for the bureaucratic model admitted that small scale organization is the alternative to bureaucracy (Weber, 1947). As by the proponents of decentralization, authority for control and policy making when closer to the constituents eliminate inefficiencies and lack of responsiveness that are rampant with central systems. However, critics of devolution do not trust that local governments can improve efficiency, with fears of resources used to produce private goods in place of services with greater public health benefits (Angeles, et.al., 1999).

Ideally, decentralization can improve technical efficiency if it removes excess administrative levels, if it leads to innovation and discovery of new techniques for health service delivery, or if greater oversight and accountability of health workers and planners decrease wastage of resources (Hutchinson and LaFond, 2004). Studies done on federal systems have in their findings reported that central governments have an upper hand in making equitable allocation decisions, more so for assisting the poor while devolved units more effectively utilize funds to achieve efficiency (World Bank, 1994).

Levaggi and Smith (2003), during the Conference on Economics and Health Policy put forth economic arguments favouring devolution of policy making of public services to lower levels of Government. They argued that because devolved units are closer to local
institutions and the constituents, sources of inefficiency can be identified by the management and therefore addressed. The local people are also actively involved and therefore there is expected efficient delivery of the health services governed locally. They also brought in the idea of accountability, where the financing of public goods is the responsibility of the local beneficiaries, which increases Allocative efficiency and if properly implemented contribute to economic efficiency (Levaggi and Smith, 2003).

The capacity to innovate within the counties and enhanced cost-consciousness as recognized in devolution leads to improved efficiency (Bergman, 1998). Jervis and Plowden (2003) also reported that health care strategies are better implemented under devolved systems based on need. Efficiency advantages as a result of decentralization policies also come through due to reduced risk of bottlenecks at the central level, which in turn increases the overall process capacity of the system (Saltman, et.al., 2007). Furthermore, decentralization is attributed to cost cutting and avoidance of duplication of services, especially secondary and tertiary health care. This can be done when responsibility is connected to the community within the coverage area (Mills, 1994).

According to Regmi et al. (2010), decentralization improves efficiency through enhancing accountability of regional administrators and allocation efficiency basing on local needs and interests which improves governance and public service provision.

The dissatisfaction with the efficiency of centrally provided (health) services has contributed to the high adoption of devolution. The large coverage areas and high populations could be the reason for such inefficiencies because of the difficulties to coordinate all the services from the central point. The extra bureaucracy and management levels required in centralized systems lead to diseconomies of scale and decision making takes longer time (Hutchinson and LaFond, 2004). Information on
local conditions is also likely to be scant in centralized systems and it may involve more costs for decision makers at the central system or government to collect such information than it would have been for local decision makers. The higher information and transaction cost involved has been argued by some researchers as the need to decentralize decision making closer to the people, more so in developing countries than the developed ones (Shah, 1998).

2.1.2 Devolution and Recentralization

Despite the literature that supports the idea of devolution to improve health services efficiency, some experiences denote contradicting results. Brazil’s devolved units are the municipalities which were entitled to receive funds directly from the federal government to facilitate for all levels of care. This was through The Gestão Plena do Sistema Municipal. It incentivized municipalities to invest more in hospitals, laboratories, and high-tech equipment. These were before then under-utilized because of the municipality population sizes. There emerged new inefficiencies from the system of direct transfers to municipalities which were attributed to; loss of the economies of scale normally realized when producing most complex medical services, reduced size of risk-pool which was used to finance the advanced care; and large increases in transactional costs because of replication of administrative functions throughout the municipalities (World Bank, 2003).

Norway has undergone some form of recentralization too after almost two decades of devolution. Norwegian reform process can serve as a good illustration of how difficult an application of fiscal federalism to the health care sector is in practice (Magnussen, et.al., 2007). The devolved system was created in 1998 with 19 counties. Responsibility was given over education, health and part of road infrastructure. However, specialized
care was regained by the central government more and more in the 15 years that followed through more regulations on the counties (Magnussen, 1998). The year 2002 saw the recentralization of specialized care to the central government. Further, operating authority was recentralized from the 19 elected counties to the central government who appointed 6 regional boards in their place. The responsibility for financing health sector remained at national and not regional level. These actions were prompted by the experiences they had with devolved units.

The decentralized system saw hospitals in Norway agree on soft budgeting with the counties, which was eventually passed to the national government. The system therefore failed to satisfice from the efficiency perspective or that of containing the cost, failing on the main objectives of devolution for healthcare (Saltman, et.al., 2007). The devolved units also seemed to be in competition for services which resulted in service duplication therefore decreased technical efficiency (Magnussen and Mobley, 1999). The reforms, however, have not proven any better for Norway with the first two years of the reform seeming to show growing inefficiencies while effects on total cost containment uncertain.

Other countries also seem to be in the same boat as Norway with their recentralization policies on important health system functions. Denmark recentralized operating and financing responsibility from the 14 county councils (elected) in 2006. It then created 5 regional governments with health care operating authority, but the financing responsibility remained exclusively with the state. Poland and Slovakia has also recentralized what was regionalized sickness fund structure. These trends tend to raise fundamental questions regarding decentralization policies in healthcare. “Is the local democracy argument now being supplanted by the economic efficiency argument?” (Saltman, et.al., 2007).
2.2 Empirical literature

While many studies have been done on devolution and decentralization around the world, less attention has been given to how it affects the efficiency of service provision in particular. Strumpf, et al. (2001) studied the effects of decentralization on allocative efficiency, with reference to the provision of public and private goods in Ugandan public health sector and acknowledged the scant attention in health economics literature to efficiency issues in health goods and services provision due to devolution. Their study used the government data on resource allocations to determine their budgeting decisions regarding provision on public goods versus private health goods. Findings indicated that local governments used more resources to provide private goods in the expense of public goods. This was because local governments provide the preferences of the citizens, who choose the goods that benefit them directly. Local governments were seen to behave like individuals and therefore choose the goods and services that accrue direct benefits. Decentralization thus decreased the Allocative efficiency in these districts (Strumpf, et al., 2001).

2.2.1 Healthcare facilities and technical efficiency scores

Devolution brings the decisions on healthcare infrastructure closer to the people that they participate based on needs. Accessibility to healthcare institutions is the first step towards attaining comprehensive healthcare and therefore health centers and hospitals are built and operationalized as by the population preferences. This may however disadvantage the public goods provision (Strumpf, et. al., 2001). Brazil’s devolved system received development funds directly from the federal government with incentives to invest more in hospitals, laboratories and high-tech equipment (World Bank, 2003) so as to increase service coverage and access to the public.
Granting autonomy to hospitals can also be viewed as decentralizing or deconcentrating authority from the national government (Rondinelli, et. al., 1984). There are a few studies that have been done to measure the efficiency of the autonomous hospitals compared to the ones still under the central system. Data Envelopment Analysis (DEA) and regression analyses were used to measure technical efficiency and estimate determinants of efficiency respectively (Cellini, et. al., 2000; Giuffrida, et. al., 2000; Fabbri, 2001). The findings, which were based on technical efficiency scores, indicated difference in efficiencies due to the different organization setups. Autonomous hospitals repeatedly showed higher efficiency scores than those still integrated to the national system. This can be replicated in devolved systems since both concepts involve transfer of authority from the centralized system.

Most technical efficiency studies globally have focused on hospitals, health centers and such health set ups. This can be attributed to the growing pressure to improve hospital performance amid the scarcity of resources through proper resource allocation (WHO, 2000). Hollingsworth (2008) provided an overview of the various studies undertaken on hospital efficiency. Data Envelopment Analysis method was widely used in these studies which cover mostly the developed countries.

Not many studies on technical efficiency on the other hand have been undertaken in Africa, but the available ones followed the trend of analyzing health facilities performances using Data Envelopment Analysis. Two studies on South Africa’s public hospitals and public clinics (Kirigia, et al., 2000; 2001) found that substantive reduction of inputs is needed to enhance efficiency of these facilities. Zere (2006) in the same country found 58% of all the hospitals inefficient- inefficiency scores of between 35%-47% percent. 58% of the facilities were operating at a sub optimal scale. In Kenya,
Kirigia, et al. (2002) found that 74% of public hospitals were efficient, while 44% of public health centers (Kirigia, et al., 2004) were found to be inefficient.

A pilot study in Ghana by Osei, et al. (2005) found 47% of the hospitals were technically inefficient, with an average TE score of 61%; 59% of the hospitals were scale inefficient, an average SE of 81%. Among the health centers, 18% were technically inefficient, with a mean TE score of 49%; 47% were scale inefficient, with an average SE score of 84%. Sebastian and Lemma (2010) did a study in Ethiopia (Tigray) on health extension program efficiency, and found the mean scores for technical and scale efficiency to be 0.57 and 0.95 respectively. Out of 60 health posts, 25.0% were found to be technically efficient. 63.3% were operating at their most productive scale size.

It is worth noting that among these studies on technical efficiencies, none focuses on devolution, or devolved units for that matter. They however help in pointing out the efforts to measure efficiency in the health sector in Africa.

2.2.2 Healthcare human resources and devolution

Human resource functions are key to the health sector performance. Devolving decision making of these functions accelerates acquiring health workers, rewarding and disciplining and using merits and standards of performance to enhance productivity. The health workers are monitored, supervised and rewarded by close health officials, which improves their performance. Devolving human resource decision making also allows health staff to be deployed to areas and activities based on need (Kolehmainen-Aitken, 1998).
Kenya’s devolution however faced a lot of challenges due to the healthcare human resources being against their seconding to the county governments. Industrial actions followed with their unions leading them. The doctors and medical practitioner’s union reports showed that 800 doctors resigned from government hospitals since devolution started up to 2014. Most doctors also migrated to richer counties where private clinics can do better. This meant that other counties had to deal with the shortage of doctors thus affecting their service delivery. It is worth noting that these are mostly the counties that devolution targeted to enhance equity in service provision.

The perception of the healthcare workers on devolution also played a role in their acceptance of devolution. A study done in the University of Nairobi showed that only 36% of the medical students in their clinical years (years 3, 4 and 5) would want to work in government institutions with others preferring the private/mission or Non-Governmental organizations. 73% of them also felt that the devolution pillar of efficiency cannot be met by the county governments (Nyongesa, et.al., 2015). Experience from devolved countries however note the anticipated teething problems that are to be conquered over time.

2.3 Summary of literary review

With more and more countries considering devolution as a strategy to improve health sector performance, the scant literature on the effects on health services efficiency of devolution policies pose a challenge to its evaluation. More focus is cast on implementation because of its ideal objectives but more focus should be put on the real experiences of devolution. Countries that are already recentralizing after years of decentralization citing inefficiencies of devolution like Norway pose questions on the efficiency objectives of decentralization. There is no empirical literature however, to
support recentralization policies in efficiency improvements. Many health systems are trying to accommodate the challenges posed by devolution through limiting decentralized decisions with others creating centralized bodies to provide a minimum level of services to all citizens. The concept of decentralization therefore becomes fuzzier and difficult to assess its effects (Magnussen et al., 2007).

The lack of empirical studies to support the objective of devolution on efficiency improvements results in a research gap that needs to be dwelled on. The devolved units that come with devolution opens up decision making units (DMU’s) where health economists should focus on so as to come up with data to support policies and decisions in the counties.
CHAPTER THREE: METHODOLOGY

3.1 Research design

The research design used was a cross-sectional survey. ‘Ex-ante’ and ‘ex-post’ secondary data, as is in health economics studies, from devolution periods was collected from the county’s health information platforms and subjected to econometric analysis using the Data Envelopment Analysis (DEA) to allow for comparison.

3.2 Study variables

3.2.1 Dependent Variable

This was represented by the efficiency score, which determines how best the factors of production have been combined to yield maximum results. This was derived using the DEA model.

3.2.2 Independent Variables

These were the input factors into the health system that are combined to yield the outputs, which are the number of hospitals, the number of primary care facilities and the number of healthcare human resources. Their combination ratios in the production function determines the efficiency scores. The health system- whether devolved or centralised- determines the mix of these factors to be deployed, which are the labour and capital resources.

3.3 Study location

The study was carried out in Bomet County, Kenya (Appendix I). Devolution provided for in Kenya’s constitution of 2010 devolves the function of healthcare provision; therefore, focus was in the county in the pre and post devolution eras, as a representative of the other devolved units in the country. According to KNBS (2015) Bomet County
has a total population of 846,012 and projected to be 891,168 by 2017, a 2.3% growth. It covers an area of 2037.4 km². It borders Kericho county to the north, Narok county to the east and south and Nyamira county to the west. The county is largely an agricultural economy, with tea farming, dairy farming and horticulture being the leading economic activities.

3.4 Study Population

The study subjects were the five sub-counties of Bomet County as a devolved unit responsible for carrying out devolved functions, healthcare provision included. The input data captured the resources invested by the county in healthcare provision, which was collected as sub-county aggregates.

3.5 Sampling technique

The choice of Bomet county was reached purposively as a devolved unit among the 47 counties since the data from all the counties proved difficult to get given the time, finances and the reliability of the data. Notably, Bomet county healthcare workers did not participate in the 2014 strikes according to the Ministry of health. The Council of Governors also in their report of 2014 placed Bomet county in second place in terms of healthcare service delivery among the counties. However, the Health Sector Analysis Report (2013-2014) shows its relative efficiency as below average (43.1%). These seemingly differential results made Bomet county an area of interest.

Input and output data were purposely chosen to reflect on their ease of access, timeliness and completeness. The major healthcare managers at the county headquarters, that is the county executive committee member for health, the chief officer for health and the county director of medical services and the five sub-county medical officers of health were used as key informants in interviews after the computing
of efficiency scores to give their expert views on the subject matter, them being responsible for rolling out devolution policies in the department of health.

3.6 Research instruments

A data checklist detailing on the inputs and outputs data from the county at a period prior and after devolution was used. This is the data that was fed to the DEA model to determine the efficiency scores. A key informant interview guide was used to collect information from the county health managers regarding their views on the computed efficiency scores.

3.7 Data collection techniques

Quantitative and secondary data were collected using a data checklist from the county departments of health and the Ministry of Health information platforms. These included the District Health Information Software, the Master Facility List and the Integrated Payroll and Personnel Database. Key informant interviews were conducted after computing efficiency scores to give county health managers a chance to scrutinize the data and give their views.

3.8 Validity and reliability

Since the data were secondary and quantitative, cross checking was done to ensure reliability. The report summaries from the county were used to crosscheck the information in their records. To ensure accuracy, standard checks were done on the data.
3.9 Data management

3.9.1 Estimation technique

Data Envelopment Analysis (DEA) introduced by Charnes, Cooper and Rhodes (1978) is a non-parametric linear programming method which measures technical efficiency relative to a frontier among different Decision Making Units which are fairly homogenous. The efficient frontier or data envelop is plotted using input and output combinations from the best performing DMU. This study will use DEA to evaluate relative efficiencies among the sub-counties as DMU’s. The sub-counties along the best practice frontier are considered efficient and are assigned an efficiency score of 1 or 100%. Those sub-counties below the frontier are assigned a technical efficiency score of between 0 and 1 or 1% and 100% and are measured by their distance from the frontier. Health production involves multiple inputs and multiple outputs, therefore justifies the use of DEA by this study to estimate the technical efficiency level in the county. The individual technical efficiency of the sub-counties is defined as:

\[
TE = \frac{\text{weighted sum of outputs}}{\text{weighted sum of inputs}}
\]

Algebraically, TE score of an individual county can be calculated by solving the following equation, assuming a Constant Returns to Scale (CRS) in model 1 and Variable Returns to Scale (VRS) in model 2:
## Model 1: DEA model, CRS

\[
\text{Eff} = \max \sum_r u_r y_{r0} \\
u_r, v_i \\
\text{s.t}\ \\
\sum_i u_r y_{rj} - \sum_i v_i x_{ij} \leq 0; \ \forall j \\
\sum_i v_i x_{ij0} = 1 \\
u_r, v_i \geq 0; \ \forall i, \forall r.
\]

## Model 2: DEA model, VRS

\[
\text{Eff} = \max \sum_r u_r y_{r0} + u_o \\
u_r, v_i \\
\text{s.t}\ \\
\sum_i u_r y_{rj} - \sum_i v_i x_{ij} + u_o \leq 0; \ \forall j \\
\sum_i v_i x_{ij0} = 1 \\
u_r, v_i \geq 0; \ \forall i, \forall r.
\]

Where

\(y_{rj}\) = the amount of output \(r\) produced by sub county \(j\),

\(x_{ij}\) = the amount of input \(I\) used by sub county \(j\),

\(u_r\) = the weight given to output \(r\), \((r=1, \ldots, t\) and \(t\) is the number of outputs\)

\(v_i\) = the weight given to input \(i\), \((i=1, \ldots, m\) and \(m\) is the number of inputs\)

\(n\) = the number of sub counties,

\(j0\) = the sub county under assessment

Constant returns to scale (CRS) means that the output in a production process increases proportionally to the increase in the inputs. A sub county exhibiting such scenario means that it is operating at its most productive scale size. However, most health
systems do not operate at such level and therefore the varied returns to scale model. Here, the output changes are not proportional to the input changes. Where the output changes are less than proportionally to the input increase, then the health system is experiencing decreasing returns to scale (DRS) and where the output changes are more than proportionally to the input increases, there is Increasing returns to scale (IRS). Scale efficiency determines whether a system is operating at its optimal production scale or not, and is derived from dividing the CRS technical efficiency score by VRS technical efficiency score.

\[
\text{Scale efficiency score (SE)} = \frac{\text{CRS TE Score}}{\text{VRS TE Score}}
\]

Data Envelopment Analysis according to Osei, et. al. (2005) and Kirigia (2010) is mostly preferred in healthcare efficiency determination due to its strengths in; i) ability to compute efficiency using multiple inputs and outputs, which is common in healthcare production, ii) use of inputs and outputs without the need to functionally relate them and they can also be different units of measurement, iii) facilitating comparisons between fairly homogeneous DMU’s like counties or hospitals and iv) non-requirement of cost or price information of the inputs. However, it has limitations; i) any deviation from the efficient frontier is attributed to inefficiency while it could have been due to statistical noise, and ii) it is non-parametric, therefore difficult to carry out hypothesis testing on inefficiency.

**3.10 Data analysis**

The data was analysed using the DEA software. Input and output data was keyed on an excel sheet then the DEA software applied to obtain the efficiency scores. Analysis took two forms, first the data from the period prior to devolution and then period after
rolling out devolution. The county mean efficiency scores for the two periods were be compared to ascertain the changes if any. Information from the key informant interviews was then used to explain the results.

3.11 Ethical consideration

This study sought approval from Kenyatta University Graduate School’s Board of Postgraduate Studies (BPS), Kenyatta University Ethical Review Committee (KUERC), National Council of Science, Technology and Innovation (NACOSTI), Ministry of Health to use their information resources and Bomet County government to carry out research in the county and use their information resources.
CHAPTER FOUR: RESULTS

4.1 Technical efficiency scores

From the different input values (Tables 4.2, 4.3 & 4.4) into the county health sector in the two periods that is before and after devolution kicked off, together with the county health output values (Appendix II), technical efficiency scores of the two periods were calculated using the DEA software as explained in chapter 3.

Table 4.1 shows the technical efficiency scores of Bomet county based on the data of the year 2012 before devolution and 2015 after devolution.

Table 4.1 Efficiency score summary

<table>
<thead>
<tr>
<th>Firm</th>
<th>Crste</th>
<th>Vrste</th>
<th>Scale</th>
<th>Returns to scale</th>
<th>Crste</th>
<th>Vrste</th>
<th>Scale</th>
<th>Returns to scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chepalungu</td>
<td>0.926</td>
<td>0.975</td>
<td>0.950</td>
<td>drs</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>-</td>
</tr>
<tr>
<td>Sotik</td>
<td>0.841</td>
<td>0.856</td>
<td>0.983</td>
<td>irs</td>
<td>0.915</td>
<td>1.000</td>
<td>0.915</td>
<td>drs</td>
</tr>
<tr>
<td>Konoin</td>
<td>0.853</td>
<td>1.000</td>
<td>0.853</td>
<td>drs</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>-</td>
</tr>
<tr>
<td>Bomet east</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>-</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>-</td>
</tr>
<tr>
<td>Bomet central</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>-</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>-</td>
</tr>
<tr>
<td>MEAN</td>
<td>0.924</td>
<td>0.966</td>
<td>0.957</td>
<td>drs</td>
<td>0.961</td>
<td>1.000</td>
<td>0.961</td>
<td>drs</td>
</tr>
</tbody>
</table>

Note:  
**crste** = technical efficiency from CRS DEA  
**vrste** = technical efficiency from VRS DEA  
**scale** = scale efficiency = crste/vrste  
**Drs** = diminishing returns to scale  
**Irs** = increasing returns to scale
4.1.1 Pre-devolution efficiency scores

Assuming a constant returns to scale (CRS) model, the results show that two of the five sub-counties (Bomet East & Bomet Central) which represents 40% are relatively efficient with a technical efficiency score of 1 or 100%. Of the three which were CRS relatively inefficient, Chepalungu had a technical efficiency score of 0.926, with Sotik’s score being 0.841 and that of Konoin being 0.853. This gives a county mean score of 92.4%.

However, when it came to Varied Returns to Scale (VRS) technical efficiency scores, 60% were relatively efficient with a technical efficiency score of 100%. These were Bomet East, Bomet Central and Konoin sub-counties. Chepalungu and Sotik which are relatively technically inefficient had scores of 0.975 and 0.856 relatively. The county VRS technical score mean from the above is 0.966.

4.1.2 Post-devolution efficiency scores

The post-devolution era data showed that the Constant Returns to Scale technical efficiencies in the sub-counties improved, with now 4 out of five of them being relatively efficient, that is they have an efficiency score of 100%. Only Sotik sub-county had an efficiency score of less than 1, that is 0.915, which is also an improvement from the 0.841 in the 2012 data. The mean CRSTE for the county was 0.961, up from the 0.924 from the 2012 data.

The varied returns to scale technical efficiency measure shows that all the five sub-counties were relatively efficient with a score of 100%. This is unlike the pre-devolution score which only 60% had an efficiency score of 100% and the VRSTE mean for the county was 0.966.
4.2 Returns to scale of health production

Table 4.1 gives the scale efficiency scores of the sub-counties in the two periods under study. Scale efficiency scores showed that before devolution, two of the five sub-counties, that is Bomet East and Bomet Central operated at optimum production levels with a score of 1. The other three sub-counties which were regarded as scale inefficient had scale efficiency scores of 0.950 (Chepalungu), 0.983 (Sotik) and 0.853 (Konoin). Chepalungu and Konoin sub-counties depicted diminishing returns to scale while Sotik showed increasing returns to scale. Bomet county mean scale efficiency at 2012 was 0.957, showing diminishing returns to scale.

The scale efficiency scores show that in 2015 (after devolution), 4 out of 5 of the sub-counties were operating in optimal production levels with a scale efficiency of 100%, with only Sotik having a scale efficiency score of less than 1, which is 0.915, thus deemed scale inefficient with diminishing returns to scale. The mean scale efficiency score for the county is 0.961 from the 0.957 in the 2012 data, still showing diminishing returns to scale.

4.3 Changes in hospital and primary health facility numbers

Hospitals in the county are the third tier in the decentralized system grading of healthcare, which comprise of the county and sub-county referral hospitals, previously the level 4 and level 5 hospitals. Table 4.3.1 shows the number of hospitals in Bomet county before devolution (2012) and after devolution (2015).

4.3.1: Change in hospital numbers

Hospitals include the previous level 4 and above facilities, currently tier three. Table 4.3.1 below shows the hospital numbers in Bomet County in the two periods under study.
Table 4.3.1 Number of hospitals in Bomet County

<table>
<thead>
<tr>
<th>SUB-COUNTIES</th>
<th>NO. OF HOSPITALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bomet Central</td>
<td>1</td>
</tr>
<tr>
<td>Bomet East</td>
<td>1</td>
</tr>
<tr>
<td>Chepalungu</td>
<td>0</td>
</tr>
<tr>
<td>Konoin</td>
<td>0</td>
</tr>
<tr>
<td>Sotik</td>
<td>1</td>
</tr>
<tr>
<td>COUNTY TOTALS</td>
<td>3</td>
</tr>
</tbody>
</table>

The county data reports of the year 2012 before devolved governments came into operation shows the number of hospitals in the county were only 3, with 2 being private mission. However, in the reporting period of 2015 two years into devolution, the number of hospitals has increased to 8, an addition of 5 more hospitals, one in each of the county’s five sub-counties. These are the sub-county referral hospitals which provide more comprehensive curative services to the referrals from the sub-county health facilities.

4.3.2 Primary health facility changes

Primary health facilities are the tier 2 and tier one facilities, which were previously level 1, 2 and 3. They include the health centers, the dispensaries and the community health units. Table 4.3.2 represents the number of primary health facilities in the county as an aggregate of the sub-counties in the two periods under study.
Table 4.3.2 Primary healthcare facilities in Bomet county

<table>
<thead>
<tr>
<th>SUB-COUNTIES</th>
<th>NO. PRIMARY CARE FACILITIES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bomet Central</td>
<td>19</td>
<td>23</td>
</tr>
<tr>
<td>Bomet East</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Chepalungu</td>
<td>26</td>
<td>32</td>
</tr>
<tr>
<td>Konoin</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>Sotik</td>
<td>27</td>
<td>33</td>
</tr>
<tr>
<td>COUNTY TOTALS</td>
<td><strong>109</strong></td>
<td><strong>132</strong></td>
</tr>
</tbody>
</table>

The primary healthcare facilities, which cover the two lowest tiers of facilities increased in number from the 109 that were in operation from the reports of the year 2012 to 132 functional primary health facilities as per the 2015 facility reports, representing a 21.1% increase. An average of additional four facilities were established or operationalized within each of the five sub-counties after devolution, with a bulk of these being the dispensaries.

4.4 Healthcare workforce

The table 4.4 shows the human resource compositions of the health sector in Bomet County in terms of numbers of the different designations in the two different devolution periods under study.

The total number of the health workers in the county as per the data from the year 2012 was 553 which increased by 87.2% to 1035 as per the records of the year 2015. Of this increase, the general nurses who are the majority among the healthcare workforce recorded the highest increase in terms of numbers from 292 in 2012 to 564 in the year 2015. The nursing officers (BSNs) increased from 1 in 2012 to 7 in the staff data of 2015.
### Table 4.4 Human resource composition

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Records &amp; Information Mgt. Officers</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Physiotherapist</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Community Oral Health</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Medical Directors</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Public Health Officers</td>
<td>76</td>
<td>132</td>
</tr>
<tr>
<td>Occupational Therapist</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>BSNs</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>General nurses</td>
<td>292</td>
<td>564</td>
</tr>
<tr>
<td>Chief Radiographer</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Clinical Officers</td>
<td>70</td>
<td>96</td>
</tr>
<tr>
<td>Community health extension worker</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Family Physician</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>General Surgeon</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>OBGYN</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Med Lab</td>
<td>40</td>
<td>66</td>
</tr>
<tr>
<td>Medical Engineers</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Medical Officers</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>Medical Social Workers</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Nutrition &amp; Dietetics</td>
<td>10</td>
<td>38</td>
</tr>
<tr>
<td>Orthopaedic technologists</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Paediatrician</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Pharm Techs</td>
<td>15</td>
<td>27</td>
</tr>
<tr>
<td>Renal Nurses</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Clinical Officer (Anaesthetist)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Senior Dental Technologist</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>553</strong></td>
<td><strong>1035</strong></td>
</tr>
</tbody>
</table>
The number of medical specialists also increased, some who were not there at all. The renal nurses were 3 as by 2015 but were not there at 2012. A general surgeon, a family physician, a paediatrician and a gynaecologist were also employed (1 each) by 2015. The county employed an additional 14 medical officers from the 7 captured in the 2012 data to the 21 that are in the data of the reporting year 2015. There was only one medical director in 2012 and in 2015 they were four.

From the reports of 2012 before devolution officially started to reports of 2015 when devolution was ongoing, the number of occupational therapists increased from 1 to 5, with chief radiographers increasing from 2 to 4. An additional 26 clinical officers were employed bringing the number to 96 from 70. From the 76 public health officers that were there in 2012, 56 more were added to make the totals in the county to 132.

Medical laboratory technicians in the county increased from 40 to 66 from 2012 to 2015. The county employed 10 more medical engineers to make the number 17 up from the 7 previously employed in 2012. The pharmacy technologists in the county were increased from 15 in 2012 to the 27 that were reported in the 2015 staff data.
CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Efficiency score changes

The CRS model of DEA shows that the county as per the 2012 data (pre-devolution) has a mean technical efficiency score of 92.4% with 40% of the sub-counties being technically efficient, a technical efficiency score of 100%. The 60% inefficient sub-counties had a mean technical efficiency score of 87.3%, meaning that they could attain efficiency by minimizing their input ratios by 12.3% on average.

The VRS model on the same data of 2012 before devolution gives the mean technical efficiency scores of the county to be 96.6%. Here, 60% of the sub-counties are seen as technically efficient, a score of 100%. The 2 sub-counties which are inefficient have an average TE score of 91.6%, thus to attain the efficiency gradient, these sub-counties ought to slash their input ratios by 8.4%.

The pre-devolution results also showed that 2 out of the 5 sub-counties were operating optimally while 60% showed diminishing returns to scale, meaning an increase in the production inputs results in a decrease in the health outputs. The average scale efficiency score for these sub-counties is 92.87%, meaning they should scale down their productions by an average of 7.13%. These results concur with a research done in South Africa (Kirigia et al 2000;2001) which reported that to realize efficiency, the hospitals and clinics needed to reduce its inputs substantively.

These technical efficiency results show a slight drop from the country average scores found by Kibe (2010), where the average technical efficiency scores for level four...
hospitals in Kenya was found to be 97.72%. The difference can however be explained by the inclusion of lower tier health facilities in this study, where the lower tiers are seen as more inefficient than the level four hospitals. This can be supported in the researches in Kenya which found out that 26% of public hospitals were inefficient (Kirigia, et al., 2002) while 44% of public health centers were found to be inefficient (Kirigia, et al., 2004).

The technical efficiency scores calculated using the data from post-devolution period (2015) show some bit of improvements in the technical efficiency scores. Assuming a CRS model, the county’s mean technical efficiency score was 96.1%, with the ratio of efficient sub-counties being 80%. This is an increase from the pre-devolution scores where only 40% of the sub-counties were technically efficient. The mean T.E score of the county also increased by 3.7%.

VRS DEA results from the post-devolution period shows that all the sub-counties are technically efficient, all score 100%. This is an improvement from the pre-devolution’s mean technical efficiency score of 96.6% where only 60% of the sub-counties were technically efficient. The TE score post-devolution increased by 3.4 %. This is in tandem with studies which showed that devolved units better utilize their resources to achieve efficiency (World Bank 1994; Saltman et al 2007).

The scale efficiency scores of the sub-counties also increased after devolution, where 80% of now had an SE score of 100%, meaning they were operating optimally. Its only Sotik sub-county with a SE score of 96.1% that showed diminishing returns to scale, therefore should cut down or production mixes by 3.9% to realize optimum operation.
scale. The Sub-county medical officer of health in Sotik attributed this to the number of facilities being more and the health outputs being largely a shared value in the county.

All these efficiency scores show improvements from the pre-devolution era to the post-devolution era. These results are related to the findings by various studies (Cellini, et. al., 2000; Giuffrida, et. al., 2000; Fabbri, 2001) which found out that autonomous hospitals repeatedly showed higher efficiency scores than those still integrated to the national system. The autonomy in these hospitals is a concept that can be equated to the devolved healthcare in this study.

5.1.2 Changes in hospital and primary health facility numbers

The county government records showed an increase in the number of hospitals in the county by 5, bringing the total number to 8. The hospitals, which are the third tier in the devolved structure, offer a greater range of services and act as referral points to the lower tier facilities. According to the county executive committee member (CECM) for health, there was need to upgrade a facility in every sub-county to offer the services to the residents in those devolved units and to ease the congestion in the county referral hospital, sentiments echoed by the sub-county medical officers of health (SCMOHs). The upgrade came with improved range of services, increased staff and availability of specialized services in the sub-counties. This is the essence of devolving healthcare where access and coverage of most of the healthcare services is increased, bringing them closer to the population as it was in Brazil’s devolved system (World Bank, 2003).

Primary healthcare facilities in the county include the health centers, the dispensaries and the community units. The community units are an integral part of the health system since they create the demand for healthcare (KHSSP, 2014-2018). They are manned by
the community health extension workers (CHEWs) and are responsible for identifying the health needs and situation in the communities. Critics of devolution point out devolution’s neglect of the public goods (Strumpf, et. al., 2001), but through creation of the community health units and continued involvement of the CHEWs, health as a public good has been prioritized right from the lowest point of community welfare and not merely on disease treatments. The population therefore in this devolved system is greatly involved in their health affairs (Regmi et al., 2010).

From the community units, residents are referred to the dispensaries for mild ailments, or further referred to the health centers which offer more comprehensive services. According to the county director of medical services, more of these primary healthcare facilities improve the health seeking behavior in the communities, therefore justifying the county government’s investment in more of these units. County data reports from the year 2012 before devolution of healthcare officially rolled out shows that the county had 13 health centers and 96 dispensaries, making a total of 109 primary health facilities.

However, by 2015, the number of health centers in the county had increased to 18 and the dispensaries to 114. Upgrading was done to health centers to replace those upgraded to sub-county hospitals and to create new health centers. New dispensaries however had to be built, some equipped and operationalized since others had been upgraded and other areas needed new dispensaries. All these new and upgraded units came with staff, equipment and other amenities needed to provide the services to the community. With these facilities offering timely and affordable services, the county director of medical services pointed out the improved outcome indicators in these areas to be as a result of the improved coverage of medical facilities,
5.1.3 Healthcare workforce numbers and composition changes

In 2012, before devolution was rolled out, Bomet County had a total of 553 health workers spread across the county. This however increased to 1035 by the year 2015. The county records show not only an increase in the number of health workers but also introduction of new specialists and increase in number in the existing ones. Devolving healthcare, according to World Bank means that a county health system should be self-sufficient to a larger percentage; therefore, it should offer specialized services as much as it can, with high-end equipment and also specialist medical staff to offer the services (World Bank, 2003). It is in this regard therefore that the county director of medical services emphasized on the need for improvement in the healthcare workforce, both in numbers and skills to offer timely and specialized care.

The general nurses, the biggest cadre of health workers increased from 292 to 564. These are spread all over the county even to the lowest level facility so that services everywhere are up to standard. Due to the introduction of a renal unit in Longisa county referral hospital, the county sought services from 3 new renal nurses. To cover the increased range of services and number of facilities in the county, clinical officers too increased in number from 70 to 96. Radiologists increased from 2 to 4 to cover the introduction of radiology services in Ndanai sub-county and Sigor sub-county hospitals.

The number of doctors in the rank of medical officers increased from 7 to 21, representing a 200% increase. There was no surgeon in the county hospitals before devolution since there was no existing operating theatre in any government hospital. By 2015 however, a general surgeon had been employed to work on the county referral hospital’s operating theatre. Other specialist physicians included a family doctor, a
Paediatrician and a Gynaecologist to increase the range of specialized clinics in the county referral hospital. Introduction of these new clinics and specialist professionals according to the director of medical services in the county was to provide a range of services to the public, which motivates them to seek affordable services from the county hospitals due to its quality. This corresponds to the call by the Ministry of Health to improve on the quality and quantity of medical staff in referral facilities for overall quality of services (MOH, 2011).

The 87.2% increase in staff levels is however not sufficient according to the county health management Team due to the increased health facilities to cover and the increasing number of people using the public health facilities. The goal of making the health services more accessible and affordable easily overrides the issue of human resources for health shortages in our health facilities due to the issue of financial constraints. It is however better balanced when decisions are made closer to the people in devolved units because areas worst hit are prioritized (Kolehmainen-Aitken, 1998).

5.2 Conclusion

5.2.1 Technical efficiency levels

The CRS technical efficiency mean scores of the county show an improvement in the healthcare efficiency in the county from 92.4% in 2012 prior to devolving health services to 96.1% in 2015 after health services were devolved. This represents a 3.7% increase in technical efficiency. VRS technical efficiency score increased from 96.6% to 100%, which is also an increase of 3.4%. Therefore, the findings show a general increase in the technical efficiency scores of the county after devolution of health services.
5.2.2 Returns to scale of health production

The average county scale efficiency score improved from 95.7% to 96.1%. Though it is a slight change, four out of five sub-counties are operating optimally after devolution of healthcare, up from two before it was devolved. The county average shows diminishing returns to scale, meaning the inputs should be scaled down by 3.9% to realize optimal production.

5.2.3 Number of hospitals and health facilities changes

Hospitals in Bomet County increased in number from 3 in 2012 prior to devolution’s onset, to 8 in 2015 after the commencing of devolution in Kenya. This meant upgrading of 5 facilities to have a hospital in each of the 5 sub-counties of Bomet County, referred to as sub-county referral hospitals in line with the Kenya Health Sector Strategic and Investment Plan (KHSSP 2012-2017) which factors in devolved healthcare.

Functional primary facilities, which are the health centers and dispensaries increased in number from 109 in 2012 to 132 by 2015. This meant the construction of new facilities, operationalizing the non-operational and upgrading some dispensaries to the health center levels. Health centers in particular increased from 13 to 18, while dispensaries increased from 96 to 114.

5.2.4 Healthcare human resource changes

A lot of changes were effected to the county human resources for health in terms of the numbers and composition. There was an overall increase in the number of health workers in the county by 87.2%, from 553 to 1035. General nurses increased from 292 to 564 while the number of clinical officers went up from 70 to 96. Doctors in the medical officer rank were 7 in the county before devolution, which increased to 21,
denoting a 200% increase. Apart from numbers, new specialties were introduced, which included 3 renal nurses due to creation of a renal unit. A surgeon, a family doctor, a paediatrician and a gynaecologist were also introduced to offer such range of services.

5.3 Recommendations

5.3.1 Policy recommendations

The following are the policy recommendations based on the findings from the study.

i) The county ought to create more demand for its health services and therefore increase the utilization of its resources. This could be done through the use of community units, which is responsible for bringing out the unmet needs in the population and linking the populations to the health facilities.

ii) To ensure optimum use of healthcare resources, healthcare managers ought to do frequent monitoring and evaluation of the facilities to ensure that maximum benefit is yielded from the great investments in healthcare as a result of devolution. Creation of new hospitals, new health centers and dispensaries together with the staff and equipment that come with them should be reason enough to ensure the health outcomes are enormous in the county.

iii) The range of healthcare services in the county referral hospitals should be increased and their quality improved to create in itself the confidence the population has in the public healthcare system, enhancing the prudent use of these specialized services and resources for health benefits.

iv) Policies on staff deployment should focus on flexibility, where the areas that experience acute shortage or too much workload can be cushioned without
too much technicalities. This makes a greater use of human resources that could have been less involved in their duty stations.

5.3.2 Recommendations for further research

This study recommends the following for further research;

1. An in-depth research involving larger budgets and extended timeframes to cover all the counties where data from each county can be analysed and results compared to see how the counties are faring, and use to get the mean country technical efficiency score comparisons.

2. Using DEA’s Malmquist Total Factor Productivity Index to gauge the efficiency and productivity trends in the county or counties over time. This will clearly show how efficiency scores were affected with introduction of devolution. It can be done to go back in time five years before devolution and five years after devolution.
REFERENCES


Source; Bomet county online booklet
APPENDIX II: HEALTH OUTPUT DATA

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APPENDIX III: MOH DATA USE APPROVAL

MINISTRY OF HEALTH
Office of the Director of Medical Services

Telephone: Nairobi 254-020-2717077
Fax: 2719088
Email: dmvkenya@gmail.com

When replying please quote:
Ref: No. MOH/HRD/01/(42)

Mr. Kipronoh Victor Sang
Kenyatta University
P.O. Box 43844 – 00100
NAIROBI

22nd November 2016

RE: APPROVAL TO USE DATA FROM DHIS FOR RESEARCH

Your letter dated 21st November 2016 refers.

It is noted that you are a Post-Graduate student from Kenyatta University planning to conduct a thesis study titled “Effects of devolution on the technical efficiency of health care services delivery in Kenya”.

Your request for permission to use DHIS data from Ministry of Health has been approved.

You are advised to visit the Head, Health Information Systems Unit, Ministry of Health to be facilitated to access DHIS.

Dr. Kikoko Jackson K. OGW
DIRECTOR OF MEDICAL SERVICES
APPENDIX IV: NACOSTI RESEARCH PERMIT

THIS IS TO CERTIFY THAT:

MR. KIPRONON VICTOR SANG
of KENYATTA UNIVERSITY, 0-20400
Bomet has been permitted to conduct
research in ALL COUNTIES
on the topic: EFFECTS OF DEVOLUTION
ON TECHNICAL EFFICIENCY OF
HEALTHCARE SERVICE DELIVERY IN
KENYA
for the period ending:
3rd October, 2017

Signature

[Signature]

Director General
National Commission for Science, Technology & Innovation

 Permit No: NACOSTI/P/16/18894/33455
Date of Issue: 4th October, 2016
Fee: Received Ksh. 1000
APPENDIX V: GRADUATE SCHOOL APPROVAL

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke  P.O. Box 43844, 00100
Website: www.ku.ac.ke  NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Dean, Graduate School  DATE: 12th August, 2016
TO: Mr. Kiprono Victor Sang  REF: Q140/CTY/FT/29068/14
C/o Department Health Management &
Informatics

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board, at its meeting on 10th August, 2016,
approved your Research Proposal for the M.Sc. Degree entitled, “Effects of Devolution
on Technical Efficiency of Healthcare Service Delivery in Kenya.”

You may now proceed with your Data collection, subject to clearance with the Director
General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit
to Graduate School completed Supervision Tracking Forms per semester. The form has
been developed to replace the Progress Report Forms. The Supervision Tracking Forms
are available at the University’s Website under Graduate School webpage downloads.

Thank you.

JACKSON LUVUSI
FOR: DEAN, GRADUATE SCHOOL

CC. Chairman, Department of Health Management & Informatics

Supervisors:

1. Dr. Andre Yitambe
C/o Department of Health Management & Informatics
Kenyatta University

2. Dr. George Kosimbei
C/o Department of Applied Economics
Kenyatta University
APPENDIX: KENYATTA UNIVERSITY ETHICAL REVIEW

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE
Moi Library 1st Floor, Office No. 25

Fax: 8711242/8711575
Email: chairman.kuerc@ku.ac.ke
          secretary.kuerc@ku.ac.ke
          secretariat.kuerc@ku.ac.ke
Website: www.ku.ac.ke

Our Ref: KU/ERC/APPRAVAL/VOL.1 (149)
Date: 14th June, 2016

Kipronoh Victor Sang
P.O Box 43844-00100
NAIROBI

Dear Kipronoh,

APPLICATION NUMBER PKU/809/1875"EFFECTS OF DEVOLOUTON ON
TECHNICAL EFFICIENCY OF HEALTHCARE SERVICE DELIVERY IN BOMET
COUNTY, KENYA"

1. IDENTIFICATION OF PROTOCOL

The application before the Committee is with a research topic “Effects of Devolution on
Technical Efficiency of Healthcare Service Delivery In Bomet County, Kenya ” was
received on 9th February, 2016 and discussed on 12th June, 2016.

2. APPLICANT

Kipronoh Victor Sang

3. SITE

Bomet County, Kenya

4. DECISION
The Committee has considered the research protocol in accordance with the Kenyatta University Research Policy (Section 7.2.1.3) and the Kenyatta University Review Committee Guidelines AND APPROVED that the research may proceed for a period of ONE year from 12th June, 2016.

5. ADVICE/CONDITIONS
   i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
   ii. Serious and unexpected adverse events related to the conduct of the study are reported to this committee immediately they occur.
   iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
   iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.
If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

DR. TITUS KAHIGA
CHAIRMAN ETHICS REVIEW COMMITTEE

I, [Name] accept the advice given and will fulfill the conditions therein.

Signature: ........................................ Dated this day of ............., 2016.

cc: DVC, Research Innovation and Outreach