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Efficiency Estimates of Public Health Center II Facilities in Southwestern Uganda

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Abstract: The study estimates the efficiency of public health centre II (HCII) facilities in Southwestern Uganda. Specifically, it determines the level of technical efficiency (TE), scale efficiency (SE) and estimates the economic savings required to make inefficient public health facilities efficient. An output-oriented Data Envelopment Analysis (DEA) is employed in the estimation of TE and SE. It was found out that 73 % of the HCIIs were technically inefficient while 27% were technically efficient. Mean TE stood at 72.3% implying that an average HCII could potentially improve its efficiency by increasing its outputs by 27.7%. In addition, 77% of the facilities were SE implying that they obtained the most productive scale size given the input-output combination. 23% of the facilities were scaled inefficient implying that they have more input waste attributable to their size. There is great potential for economic savings shown by different magnitudes of input reductions and output augmentations required to make inefficient facilities efficient. The study has important policy implications. The health sector should embark on rigorous periodic research and development to enhance healthcare delivery efficiently. Since the health units are small, there is a need to augment their scale sizes and improve on their management practices so as to enhance their overall productivity and efficiency. Stakeholders should scale up efforts to attract, align skills with needs and improve retention and motivation of the health workforce. Holistic investment in resource inputs is essential. A comprehensive monitoring and evaluation plan with key verifiable indicators to monitor the overall health sector performance is required.

Keywords: *Technical Efficiency, Scale Efficiency, Economic Savings, Health Center II, DEA*

1. Introduction

"Health is wealth" …. asserts the common saying. Health is a human right that has an intrinsic value and the economic case for investing in health is robust. Globally, a significant proportion of the nation's wealth is devoted to health. This is because improving health status and reducing exposure to diseases, maintaining and promoting mental and physical abilities are considered as necessary and sufficient conditions for improving human welfare (Makheti, 2017). Health plays an important role in the growth and economic development of countries through improving labor productivity, reducing the financial burden of diseases and saving health care resources (Bahadori et al., 2016). The major constraint facing most countries' health care system is the shortage of health resource inputs arising from their high costs and thus there is urgent need to ensure that the allocated resources are efficiently utilized (Farzianpour et al., 2016; Bundi, 2018). Thus a key policy challenge for the countries is to improve the outcomes of the healthcare system while containing costs of healthcare. Doing so requires measuring health system efficiency and assessing how better the health system resources are employed to produce health services (Molem et al., 2017).

However, WHO (2010) estimates indicate that about the US $300 billion (40% of health spending) is wasted annually due to health system inefficiencies suggesting that substantial cost-saving and service expansion could occur if improving efficiency was prioritized. Efficiency measurement and reporting are important responses to public accountability (Nistor et al., 2017). Therefore apart from equity and financial protection, the pursuit of efficiency is a key policy objective that informs policy decisions in most health systems (Mujasi et al., 2016). In Africa particularly Sub Saharan Africa (SSA), it is a known reality that population is characterized by poor health. The African health systems are critically resource constrained in extending health services of acceptable quality to the population. It is urged that increasing public health-care expenditure may not significantly affect health outcomes if the efficiency of resource use is low (Grigoli, & Kapsoli, 2018). Inefficiency in the allocation and use of health sector resources is one of the inherent problems of the health systems in the region. In addition, studies done by Jehu-Appiah et al. (2014) show that the ability to adequately meet healthcare needs is exacerbated by extensive inefficiencies.

Assessing the efficiency of the health care system is recommended by the World Health Organization (WHO) as an on-going research program. Since the year 2000, WHO in response to the recommendation developed an econometric methodology for estimating the efficiency of national health care systems. It has presented rankings of countries' healthcare systems by their estimated efficiency, generating much debate, both political and academic (Oglobin, 2011). Therefore the emphasis for efficiency improvement in the healthcare industry continues to draw the attention of international bodies, governments, policymakers and researchers towards estimating efficiency (Mahajan et al., 2018). With a population of 34.9 million people (UBOS, 2014), Uganda has 112 districts in the four regions of Northern, Eastern, Southern and Western. The country's healthcare delivery system is arranged and structured from the largest to the smallest health facilities as follows; (I) National Referral Hospital, (ii) Regional Referral Hospital, (iii) District Hospital, (iv) Health Center IV, (v) Health Center III, (vi) Health Center II, (vii) Health Center I (Village Health Team-VHT). Whereas a Health Center IV facility is located in each sub-district, a Health Center III is located in each sub-county and Health Center II facility is located in each parish, according to the Ugandan district local government administrative system. The VHT located in each village is the first contact of healthcare service, composed of a team of trained volunteers and community medicine distributors.

The country's public healthcare delivery system is comprised of 1696 health centre IIs, 937 health centre IIIs, 170 health centre IVs and 64 hospitals (MoH, 2015). According to the policy, a health centre II (HCII) facility provides community-based preventive and promote healthcare services. It provides outpatient clinic, antenatal services, deliveries, immunizations, family planning, laboratory and community outreaches. It is headed by an enrolled nurse, working with a midwife, two nursing assistants and a health assistant. An HCII serves a population of about 5,000 people. Such basic health facilities serve as a backbone in healthcare delivery by making services easily accessible at the community, family and individual level (Abbas et al., 2011). However, Uganda's health care delivery system remains too inadequate to meet the needs of the ever-growing population. It increasingly faces critical resource constraints in its efforts in providing healthcare services of acceptable quality to its population (Mujasi et al., 2016).This constraint of healthcare resources is partly attributed to among other factors; rapid growth of the population, an upsurge in diseases such as malaria, HIV/AIDS epidemic, poor macroeconomic performance and cutbacks in public spending (MoH, 2015).

The combined impact of these factors causes the country to record the world's poor health services and outcomes. Empirical evidence shows that Ugandan health facilities lose a lot of resources annually to waste, register persistent stock outs and leakages of medical inputs, drugs and medical supplies, under-utilization, shortage of hospital equipment and infrastructure, thus complicating health care and service delivery (Okwero et al., 2010; Basaasa et al., 2013; Kasule, & Agwu, 2015). Knowing that health facilities are generally inefficient is a necessary condition but not sufficient unless the level and magnitude of each health facility's inefficiency are identified. Most published studies in Uganda routinely analyze and report on the efficiency of national, regional referral and district hospitals, excluding lower level and rural health units particularly HCII facilities. However, the analysis explores efficiency only in a general sense using ratio indicators and ignores other factor inputs such as operational budget, essential medicines and health supplies (drugs), medical and non-medical staff used by health centres in the production of health outputs. In addition there are limited recently published health facility efficiency studies in Uganda (Mujasi et al., 2016; Mulumba et al., 2017).

Therefore, the importance of this study is to contribute to addressing these gaps and efficiency concerns on raised questions about public health resources and how these meagre resources are utilized in HCII facilities. The study provides a detailed understanding of efficiency for healthcare managers, staff, policymakers, the academia, government and development partners. In an effort to bridge the gaps and generate meaningful results, the specific objectives of the study are to; (i) determine the level of technical and scale efficiency of public health center II facilities in Southwestern Uganda, (ii) estimate the economic savings arising from input reductions and output increases (augmentations) required to make inefficient public health center II facilities efficient. The rest of the study is structured as follows; the next section presents the review of the literature, followed by methodology, results and discussion, conclusion and policy implications. The concept of efficiency can be defined as the relationship between scarce factor inputs and outputs. It examines how well scarce resources are used to produce outputs or services.

2. Literature Review

Empirical literature shows that most efficiency studies have been estimated using parametric (Stochastic Frontier Analysis-SFA) and non-parametric techniques (Data Envelopment Analysis-DEA). DEA employs linear programming in its methodology that makes it particularly powerful compared with other productivity measurement techniques. This technique is critical in situations where there are multiple outputs and inputs, which cannot be readily analyzed with other techniques (Coelli et al., 1998). Thus literature suggests DEA as the best measurement technique of efficiency. Farrell (1957) suggested that the efficiency of a decision-making unit (DMU) consist of technical and a locative efficiency. Technical efficiency (TE) reflects the ability of a DMU to obtain maximum output from a given set of inputs. TE identifies in physical terms, the best possible combination of factor inputs required to produce given outputs (Nunamaker, 1985). It measures the ability of a DMU to avoid waste by producing as much output as resource input usage would allow, or employing as little inputs as output level allows.

The need to further analyze the effect of the size of DMU on efficiency motivates the estimation of scale efficiency (Grigoli,& Kapsoli, 2018). Scale efficiency (SE) estimates show that a DMU may be conducting a range of activities that contribute to higher the minimum average costs. Whereas some health facilities could be operating at too large scale to maximize their productive inputs, others may be too small, thus exhibiting higher average cost of production. Health facilities with higher SE scores have fewer input wastes attributable to their size (Mogha et al., 2016). Thus improvement in TE and SE measurements in public health facilities may result in large potential economic savings in the healthcare expenditures which could be devoted to expanding accessibility to promotive, preventive, curative and rehabilitative services all aimed at improving not only the quantity but also the quality of health care. An assessment conducted by Aristovnik (2015) estimated the healthcare system efficiency of 15 old and 13 new member states in the European Union (EU) for a total of 151 countries using an output-oriented DEA technique. It was found out that 27 percent and 53 percent of the EU 15 member states were technically efficient based on CRS and VRS DEA models respectively.

The study concludes that there was a potential for improving most of the inefficient regions of the EU by the optimum use of their health inputs. Other empirical studies by Grigoli (2012) and Borisov et al. (2012) compared the performance of the health system across some of the Central and Eastern Europe (CEE) and OECD countries. It was found that CEE countries in comparison to the OECD member states achieve low health outcomes with high real input resource combinations. Related findings have been found by Chu et al. (2015) in the Northeast Asian medical system. In a study to establish the efficiency levels of public hospitals in Malaysia, Samsudin (2016) employed the DEA model and found that TE and SE estimates for the two classifications of hospitals decreased in 2010 compared to 2008, implying that hospitals used more resource inputs in the latter than the former period to produce the same combination of healthcare outputs. Another study done in Latin America by Hernandez and Sebastian (2014) applied the DEA estimation approach using the sample of 34 health units from 19 districts in Alter-Verapaz in Guatemala to estimate the TE of health posts. DEA-based Malmquist productivity index was employed to estimate the productivity changes for the study period.

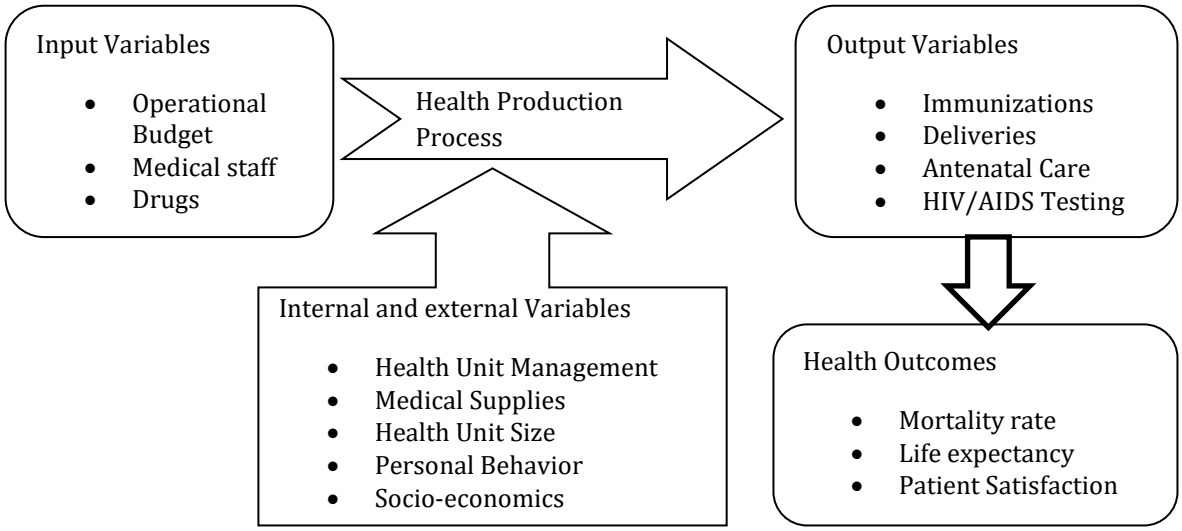
It was established that TE of the health units varied over time and the average TE score was 78 percent in 2008, while the average TE score for 2009 was 75 percent. Results of the Malmquist index indicated that the overall productivity of the health posts increased by 4 percent during the period under study mainly due to an increase in healthcare service outputs. In a study of efficiency in the pharmaceutical industry, Mahajan et al. (2018) find that the overall efficiency is lower because of the inefficient conversion of resource inputs into outputs. Using DEA and adopting the VRS technology in Ethiopian selected hospitals, Ali et al. (2017) indicated that 50%, 42%, 25%, 25%, 33% and 25% of the health facilities were technically inefficient while 75%, 75%, 58%, 58%, 58% and 67% of health units were scaled inefficient between 2008 and 2013 respectively. A growing number of countries in Africa continue to undertake efficiency studies using DEA technique to guide them to reduce wastage of limited resources (Zamo-Akono et al., 2013; Jarjue et al., 2015; Mujasi et al., 2016; Molem Christopher et al., 2017; Bundi, 2018). The non-parametric technique has been applied in analyzing the efficiency of health systems in Kenya where Kirigia et al. (2004) evaluated the technical efficiency of 32 public health centres.

Results showed that 56 percent of the public health centres were found to be technically inefficient, while the remaining 44 percent were technically efficient. Further empirical studies by Kirigia et al. (2011) employed the DEA technique to estimate the relative technical efficiency of 36 maternal and child health posts , 22 community health centres and 21 community health posts in Sierra Leone, using cross-sectional data for the year 2008. Results indicate that there were significant variations in TE and SE across and within the health posts. In Ethiopia, a study by Gebresilassie and Nyatanga (2017) indicates that there is a significant variation in TE and SE estimates across a sample of health posts. Findings show that overall health posts registered better average technical and pure TE estimates of 58 percent and 79.6 percent respectively. This implies that if they were operating at optimal scale size, they would have produced at least 42 and 20.4 percent more outputs with the same level of health inputs under CRS and VRS assumptions respectively.

A study of productivity and efficiency by Xenos et al. (2016) finds that 91 percent of public health facilities obtained a score less than unity. In Seychelles, a health centre level study by Kirigia et al. (2007) estimated the relative efficiency and productivity of 17 health centres for the period 2001 to 2004 using the DEA technology and the DEA-based Malmquist productivity index. Results indicate that there were significant variations in TE and SE scores across health centres. Overall, the average TE and SE estimates of health centres were 93 percent and 91 percent during the study periods respectively. In the estimation of efficiency and equity in medical service systems, Ding et al. (2018) find that efficiency scores of provincial level facilities varied significantly from one another. Related estimates in Meru county in Kenya by Makheti (2017) indicates that the mean technical efficiency from the sampled public health facilities was 45.2% suggesting that the existing health services can be augmented by 54.8% without the provision of additional input resources.

Similarly in a study to estimate the efficiency of public health dispensaries in Kenya, Bundi (2018) found that 41% were inefficient with average VRS efficiency at 70%, the CRS and scale efficiencies averaged 55% and 80% respectively. In another technical efficiency study of referral health facilities in Uganda, Mulumba et al. (2017) indicate that long-run inefficiency varied overtime and more than 50 percent of the inefficiencies that were observed are related to scale factors. The study recommended that inefficient health units should use efficient ones as benchmarks or role models to improve their efficiency. In general most of the empirical literature on efficiency of public healthcare facilities particularly in developing countries indicates higher and significant variations of inefficiency both technical and scale, therefore recommending for efficiency improvements to change the status quo (MoH, 2010; Kirigia et al., 2011; Borisov et al., 2012; Stierman et al., 2013; Ozcan, 2014; Nanyingi et al., 2015; Adil et al., 2016; Ahmad et al., 2017; Mwihia et al., 2018)

Figure 1: A Conceptual Model of Healthcare Production



Source: Author (2018)

Conceptual Framework: The study is guided by the conceptual framework that provides a basic, useful and a detailed understanding of the drivers of efficiency in health service delivery. Efficiency is an attribute of performance that is measured by examining the relationship between the resources used to produce a commodity (inputs) and the specific commodity of the health care system (output). A health care system is efficient if it is able to maximize output for a given set of inputs or to minimize inputs used to produce a given level of output. This relationship is presented by the interactions in the variables as shown in figure 1 above. Health facilities employ multiple health system inputs to produce multiple health service outputs through a health production process. Health inputs (operational budget, doctors, nurses, medicines and health supplies, non-medical staff) are combined with medical and surgical care to produce healthcare outputs (immunizations, deliveries, antenatal care attendances, HIV/AIDS counselling and testing, laboratory procedures). These outputs, in turn affect the levels of health outcomes in the population (life expectancy, mortality rates, health status improvement, and patient satisfaction). Whereas the ultimate output (health outcomes) of health care is the marginal change in health status, this is difficult to measure in most data sets, and therefore intermediate outputs (episodes of care) usually become the primary study outputs. It is important to note that the production process for healthcare can be influenced by a number of variables both internal and external to the health facility which may influence how efficiently the production process occurs (Coelli et al., 2005). Some of these factors are usually considered to be outside the control of health facility managers.

They are theorized either to affect the production process itself or to influence directly the efficiency of the health production process (Kumbhakar, & Lovell, 2000). When health inputs are optimized, the desired health outputs (and ultimately health outcomes) should be produced at the lowest possible cost both in terms of public resources, and in terms of private (out-of-pocket) spending. It is through the lens of this conceptual framework that this study is designed to estimate the efficiency of health service delivery as directly related to resource inputs, outputs and the health outcomes they produce.

3. Methodology

Data Envelopment Analysis (DEA) Model: The most widely used DEA models are CCR named after Charnes, Cooper and Rhodes, and BCC named after Banker, Charnes, and Cooper. These models of analysis are classified as input-oriented and output-oriented. The CCR model, developed by Charnes et al. (1978)is input-oriented and assumes that production is constant returns to scale (CRS). The BCC model, employed by Banker et al. (1984) assumes that production is variable returns to scale (VRS). Both models elaborated the efficiency concept introduced by Farrell (1957). The input-oriented models determine how much resource input quantities may be reduced while holding constant the quantities of healthcare outputs that are produced. On the other hand, the output-oriented model specifies the quantities of healthcare outputs that may be expanded without changing quantities of resource inputs. Therefore, the selection of the orientation of the model is dependent on the level to which a decision-making unit (health centre II facility) controls and manages its healthcare inputs or healthcare outputs (Jacobs et al., 2006; Ozcan, 2014; VanderWielen, & Ozcan, 2015). This study therefore adopts an output-oriented DEA model in estimating TE and SE of health centre II facilities.

Research Design: This study employed a cross-sectional research design involving both qualitative and quantitative approaches. According to Pope et al. (2000), these two approaches play complementary roles in research. The two approaches provide an in-depth understanding of the current healthcare system in terms of technical and scale efficiency levels and how they influence the day to day operations of health facilities in Southwestern Uganda. The approach employed in this study is generated from the submission of other researchers on technical and scale efficiency estimation (Zere et al., 2006; Akazili et al., 2008; Torabipour et al., 2014). The quantitative aspect of the study requires data on the operations of health facilities with respect to the composition of health input and output resources derived from each public health facility.

Data Type and Sources: This study employs cross-sectional secondary data for the financial year 2015/16. Secondary data was obtained from the Health Management Information System (HMIS) of the Ugandan Ministry of Health. The secondary sources possessed inputs and outputs data, administrative and operational

information on all public health centre II facilities in southwestern Uganda. It was supplemented by the published works from the Ministry of Health, resource centres, libraries, journals and internet sources.

Selection of Input and Output Variables: In this study, two types of variables are most important in estimating the efficiency of public health centre II facilities. They are the input and output variables. The choice of healthcare input and output variables is a key step for the successful application of the DEA technique (De Almeida et al., 2012). Therefore, the choice of the health resource input and output variables to estimate the efficiency levels of public health facilities was guided by the availability of comprehensive data routinely compiled in the HMIS and the review of previous empirical DEA studies (Renner et al., 2005; San Sebastian, & Lemma, 2010; Hernandez, & Sebastian, 2014). Therefore, the study measures the level of technical and scale efficiency of the public health centre II facilities using four major health inputs and five major output variables. The four major health inputs employed are; Operational Budget, Medical Staff, Drugs and Non-medical staff. The five major health outputs produced among all these public health centre II facilities are; Immunizations, Child Deliveries, Antenatal care Attendances, HIV/AIDS Counseling and Testing, and Laboratory services. These outputs composed the major health facility activities. Note that the inputs of medical equipment as key variable were excluded from the study because of non-availability of current data. The input and output variables are defined and measured in table 1 below.

Table 1: Definition and Measurement of Input and Output Variables

X_i	Input Variable (X)	Definition and Measurement
X_1	Operational Budget	Annual total amount of funds given to the facility in the financial year
X_2	Medical staff	Total number of medical practitioners (nurses, midwives, health assistants)
X_3	Drugs	Measured by the total annual allocations of funds for drugs
X_4	Other staff	Total number of active workers other than medical staff
Y_i	**Output Variable (Y)**	
Y_1	Immunizations	Annual total number of children immunized
Y_2	Deliveries	Annual total number of child deliveries in the health facility
Y_3	Antenatal Care	Total number of pregnant women attending antenatal services
Y_4	HIV/AIDS Testing	Total number of counselled and tested patients on HIV/AIDS
Y_5	Laboratory services	Total number of laboratory procedures conducted

Study Area and Population: All public health centre II(HCII) facilities operating in Southwestern Uganda constitute the population of the study. There are 84 public HCII facilities in the region. The selection of this population of health facilities is justified on the grounds that they comprise the largest number of health units that are located in rural areas where they serve more than 75 percent of the total population in the region. This large population of health units also consumes a substantial amount of the ministry of the health budget. The study area is chosen because of its highest population density of 300 persons/km^2, highest disease burden, the influx of the population from the neighboring countries of Rwanda, DR Congo and Tanzania, all of which have serious implications on healthcare resources for the region.

Sample Size Selection and Determination: The selection of the sample size, number of health resource inputs and the number of healthcare outputs was justified by the DEA convention (rule of thumb) that the minimum number of DMUs is greater or equal to three times the number of inputs plus outputs as suggested by Banker et al. (1989) that;

$$n \geq 3(m + s) \qquad (1)$$

Where; n = number of DMUs included in the sample
m = number of inputs included in the study
s = number of outputs included in the study
Since m = 4 inputs and s = 5 outputs, the sample size for HCII facilities is determined to be;

$$n \geq 3(4 + 5) \qquad (2)$$

$$n \geq 27 \qquad (3)$$

According to McKillop et al. (1999) and Gannon (2005) the operation of health facilities may vary according to classification and therefore the estimation of efficiency was done based on the classification of HCII level of facilities. Therefore, this study adopts a sample of 30 HCII facilities. In order to avoid biased sampling, the sample size from which this study is drawn was selected based on the population density where these health

facilities are located. The mean population density and standard deviation were estimated to determine whether a public health facility was located in the population area of 'Less Dense', 'Moderate Dense', and 'High Dense'. The mean population density (Mean) was estimated at 265 persons per square kilometer with a standard deviation (SD) of 70. The table below presents how the sample was selected from the population

Table 2: Sample Size Selection of Health Facilities

Mean and Definition		HCII Facilities	Total Sample Size
Mean	Population Area	84	
Mean-SD (<195)	Less Dense	5	
338 ≤ Mean ≥ 195	Moderate	20	30
Mean+SD (>338)	High Dense	5	

In an effort to avoid biased estimates of technical and scale efficiency, the study randomly selected 5 HCIIs from less dense population area and 5 from high dense population area. The rest 20 health facilities were also randomly selected from the areas of moderate population density. The total sample for the study is therefore 30 HCII facilities.

Data Analysis and Estimation Technique: The data collected on resource inputs and healthcare outputs were entered into a computer and exported into DEA program designed by Coelli et al. (1998); Coelli et al. (2005) installed in STATA 13. Then, DEA was employed to estimate the values of efficiency for the sample, where an output-oriented DEA model was run with variable returns to scale (VRS) technology. The VRS model was applied in the estimation of technical and scale efficiency scores for each of the sampled healthcare facilities. It is from the VRS model that the health production function exhibited either increasing returns to scale (IRS) or CRS for the individual DMUs in the sample. The VRS model was adopted basing on the assumption that in real life situations the returns to scale do significantly vary and not all public health facilities are operating at an optimal scale (Mujasi et al., 2016).

DEA Model Specification: When DMUs are given a fixed quantity of resource inputs and required to produce as much outputs as possible, an output-orientation is more appropriate and justified (Coelli et al., 2005). In Uganda public health centre II facilities receive a fixed quantity of resource inputs and health unit managers and employees are required to produce as much healthcare outputs as possible using the given health resource inputs. For example, the operational budget, medical staff, drugs and other health supplies as well as non-medical staff (other staff) of each DMU is centrally determined by the district local government and Ministry of Health. Individual health facilities do not have any control over the amount and quantity of the health resource inputs. Even when health service inputs are underutilized, health care administrators and managers have no powers to dispose them off. In this study, an output orientation is adopted based on the following arguments;

- The Ugandan health centre II facilities face shortages of resource inputs specifically human, financial resources and medical supplies
- The availability of health resource inputs is limited by government budget that is annually allocated to the health ministry
- The total population does not have full access to all the health services. Thus, productivity enhancements could be best channelled towards increasing health service outputs

The DEA technique that is employed in this analysis defines the output-oriented BCC model that takes the form below;

Maximize:

$$\Phi - \varepsilon\left(\sum_{j=1}^{p} S_j^- + \sum_{r=1}^{s} S_r^+\right) \qquad (4)$$

Subject to:

$$\sum_{i=1}^{n} \psi_i x_{ij} + S_j^- = x_{jo} j = 1, 2, \ldots\ldots p; \quad (5)$$

$$\sum_{i=1}^{n} \psi_i y_{ri} - S_r^+ = \Phi y_{ro} r = 1, 2, \ldots\ldots S; \quad (6)$$

$$\sum_{i=1}^{n} \psi_i = 1$$

$\psi_i, S_j^-, S_r^+ \geq 0 \quad \forall_{i,\ j,\ r}$

Where n refers to the number of HCII facilities (i =1, 2, ……n), p represents health resource input sx_{ij} (j=1, 2, …….p), s defines the number of healthcare outputs y_{ri} (r =1,2,…..s),$\Phi$is defined as output–oriented estimate of efficiency, ψ_i (i=1,2, …n) refers to nonnegative scalars, S^- and S^+define the excess of resource inputs and shortfalls of healthcare outputs respectively. A health unit is taken to be performing efficiently ifΦ^*=1 and the values of efficiency slacks defined to be$S_j^{-*} = S_r^{+*} = 0$, $\forall_{j,r}$. Alternatively, in case where$\Phi^* < 1$, the health unit is regarded to be performing inefficiently.

Descriptive Statistics of Input and Output Variables: Table 3 below presents the descriptive analysis for each of the resource input and output measures from the sample of 30 public HCII facilities. It shows the mean, standard deviation, minimum and maximum values for the inputs and outputs variables in the sample during the financial year 2015/16.

Table 3: Descriptive Statistics of Input and Output Variables

DMUs	Input Variables				Output Variables				
(N=30)	X_1	X_2	X_3	X_4	Y_1	Y_2	Y_3	Y_4	Y_5
Mean	1491515	2.5	9920273	1.8	1049.5	6.4	4.1	43.9	541.8
St.Dev.	424875.9	0.8	1868817	0.6	618.2	14.5	6.2	78.1	317.0
Min	1239612	1.0	7427474	1.0	201.0	0.0	0.0	0.0	70.0
Max	2184250	4.0	1.46E+07	3.0	3169.0	68.0	27.0	400.0	1817.0

Exchange Rate at the time of data collection ($1 = Uganda shillings-Ushs 3,600)

As shown in the table above, it is observed that the 30 HCII facilities were able to produce an average of 1050 immunizations, 6 child deliveries, 4 antenatal care attendances, 44 HIV/AIDS tests, and 542 laboratory procedures. The respective standard deviations are shown in the table. These outputs were produced using an average operational budget of 1,491,515 (approximately $414), 3 medical staff, expenditure on drugs worth 9,920,273 (approximately $2,756) and about 2 members of other staff (non-medical staff). The input and output measures varied widely as shown by the respective means, minimum and maximum values. This suggests that there are substantial variations across the sample in relation to the input-output combination.

4. Results and Discussion

Technical and Scale Efficiency Results: The study adopted the output-oriented model of DEA and assumed the VRS technology to estimate the level of technical and scale efficiency scores for the 30 HCII facilities. It is paramount to note that efficiency scores range from 0 (totally inefficient) to 100% (efficient). Table 4below presents a summary of the results from the sample. Only eight (27 percent) HCIIs were found to be operating efficiently. The remaining twenty-two (73 percent) health facilities had TE estimates less than 100 percent implying they were found technically inefficient. The most inefficient HCII was DMU85 which scored 27.9 percent. This implies that such a facility would need to potentially expand its health service outputs by 72.1 percent to attain efficiency. Overall the level of TE-averaged 72.3 percent meaning that an average HCII could potentially improve its efficiency by increasing the outputs it produces by 27.7 percent. These health facilities

registered a significant variation in TE with the lowest at 27.9 percent and highest at 100 percent. Based on the CRS assumption the average efficiency score was 71.9 per cent suggesting a slight reduction in efficiency with similar variations as technical efficiency. The inefficient HCIIs under the VRS assumption imply that they have the potential for increasing their health care outputs using the given quantities of current healthcare inputs. In order to estimate the impact of the size of health facility on efficiency, SE and the types of RTS were estimated.

Table 4: Technical and Scale Efficiency Results for the Sample of HCII Facilities

S/N	DMU(n=30)	Rank	TE	CRS_TE	VRS_TE	SCALE	RTS	Benchmark	λ
1	DMU41	16	0.707	0.707	0.707	1.000	CRS	DMU91	0.690
2	DMU47	23	0.523	0.523	0.523	1.000	CRS	DMU91	0.216
3	DMU49	11	0.954	0.954	0.954	1.000	IRS	DMU91	0.622
4	DMU50	20	0.597	0.597	0.597	1.000	CRS	DMU109	0.289
5	DMU54	1	1.000	1.000	1.000	1.000	CRS		
6	DMU56	17	0.678	0.678	0.678	1.000	CRS	DMU91	0.469
7	DMU63	28	0.325	0.325	0.325	1.000	CRS	DMU109	0.211
8	DMU68	12	0.849	0.849	0.849	1.000	CRS	DMU91	0.680
9	DMU69	19	0.669	0.658	0.669	0.983	IRS	DMU109	0.156
10	DMU72	29	0.293	0.293	0.293	1.000	CRS	DMU109	0.252
11	DMU75	18	0.677	0.669	0.677	0.989	IRS	DMU87	0.442
12	DMU77	24	0.473	0.471	0.473	0.996	IRS	DMU87	0.315
13	DMU81	25	0.395	0.395	0.395	1.000	CRS	DMU109	0.199
14	DMU85	30	0.279	0.279	0.279	1.000	CRS	DMU87	0.120
15	DMU86	22	0.545	0.545	0.545	1.000	CRS	DMU109	0.256
16	DMU87	1	1.000	1.000	1.000	1.000	CRS		
17	DMU88	27	0.358	0.358	0.358	1.000	CRS	DMU87	0.119
18	DMU89	26	0.395	0.395	0.395	1.000	CRS	DMU109	0.283
19	DMU91	1	1.000	1.000	1.000	1.000	CRS		
20	DMU92	1	1.000	1.000	1.000	1.000	CRS		
21	DMU93	1	1.000	1.000	1.000	1.000	CRS		
22	DMU97	13	0.835	0.835	0.835	1.000	CRS	DMU93	0.527
23	DMU104	10	0.955	0.936	0.955	0.980	IRS	DMU93	0.519
24	DMU106	9	0.995	0.954	0.995	0.959	IRS	DMU93	0.516
25	DMU107	1	1.000	1.000	1.000	1.000	CRS		
26	DMU109	1	1.000	1.000	1.000	1.000	CRS		
27	DMU110	21	0.545	0.545	0.545	1.000	CRS	DMU109	0.375
28	DMU111	14	0.829	0.807	0.829	0.974	IRS	DMU109	0.272
29	DMU120	1	1.000	1.000	1.000	1.000	CRS		
30	DMU122	15	0.811	0.791	0.811	0.975	IRS	DMU93	0.342
	Mean		0.723	0.719	0.723	0.995			
	Std. Dev.		0.257	0.255	0.257	0.010			
	Minimum		0.279	0.279	0.279	0.959			
	Maximum		1.000	1.000	1.000	1.000			

Table 4 also presents corresponding VRS mean scores of efficiency using the same estimation and it is observed that these scores are slightly higher than CRS scores but equivalent to the TE scores. This implies a slight increase in the number of health facilities that tend to approach on the frontier under the VRS technology than under the CRS technology. Twenty-three (77 percent) health facilities scored SE of 100% which implies that they were found to have obtained the most productive scale size (MPSS) for the given input-output combination or mix. Stated differently, health facilities with higher SE estimates have less input wastage that is attributable to their size. The rest seven (23 percent) HCIIs had SE scores less than unity and therefore they were regarded as scale inefficient. This means that such facilities with lower SE estimates have more inputs wastage that is attributed to their sizes. It is paramount to note that the inefficiency of a health facility may arise due to the fact that it operates under decreasing returns to scale (DRS), increasing returns to scale (IRS) or constant returns to scale (CRS). Results show that twenty-two (73 percent) HCIIs were operating under CRS which implies that an increase in health service inputs would lead to an equal increase in health service outputs.

The remaining eight (27 percent) HCIIs were found to be operating at IRS implying that an increase in healthcare inputs results in a more than increase in healthcare outputs. Therefore, to produce healthcare services at the MPSS, any health unit exhibiting IRS should scale up both its health service inputs and health service outputs. This exploration could be applicable in reallocating health resource inputs from DMUs which operate at CRS to those that operate at IRS. In Table 4 the second last column shows the benchmarks or peers or reference units for the respective DMUs and their corresponding weights (λ) which should be emulated by the inefficient HCIIs for them to be efficient. For example, DMU41 should emulate DMU91 (with the highest λ weight of 0.690) for it to be efficient. The best reference or role model health unit for DMU50, DMU63, DMU69, DMU72, DMU81, DMU86 and DMU89 is DMU109 with the highest lambda weight of 0.289, 0.211, 0.156, 0.252, 0.199, 0.256 and 0.283 respectively. Recall that DMU109 is a role model because it is 100 percent efficient. All benchmark health facilities have TE score of 1 and are therefore on the efficiency frontier.

Economic Savings from Efficiency Improvement by Health Center II facilities: The economic savings arising from efficiency improvement are the input reductions and output increases required to make inefficient health center II facilities efficient. Table 5 provides the magnitudes by which specific health service inputs and outputs per inefficient health facility ought to be reduced and or increased respectively. When policymakers and healthcare managers are equipped with the magnitudes by which they should be adjusted, they could significantly improve the functioning and therefore the efficiency of the health care delivery system.

Table 5: Input Reductions and Output augmentations needed to make inefficient Health Center II facilities efficient

S/N	DMU	Input Slacks				Output Slacks				
	(n=30)	X_1	X_2	X_3	X_4	Y_1	Y_2	Y_3	Y_4	Y_5
1	DMU41	0.0	1.0	2910901.0	0.0	0.0	0.0	6.9	51.4	0.0
2	DMU47	0.0	0.0	385421.0	0.0	0.0	0.0	0.5	40.2	0.0
3	DMU49	1671.7	0.0	1964.0	0.0	0.0	6.4	6.5	145.1	0.0
4	DMU50	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	351.0
5	DMU54	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	DMU56	0.0	0.7	1070212.0	0.0	0.0	1.2	1.9	80.3	0.0
7	DMU63	0.0	0.0	2013745.0	0.5	0.0	4.2	0.2	35.0	0.0
8	DMU68	0.0	0.8	1.6	0.1	0.0	1.9	6.9	84.1	0.0
9	DMU69	21838.3	0.0	1052637.0	0.0	0.0	6.9	0.0	67.6	0.0
10	DMU72	0.0	0.0	22959.9	0.0	0.0	5.0	0.7	24.3	0.0
11	DMU75	350155.0	0.0	371745.0	0.6	0.0	0.0	1.3	37.7	98.3
12	DMU77	225733.0	0.0	175011.0	0.0	0.0	0.1	0.8	26.4	118.7

13	DMU81	631612.0	0.8	921888.0	0.0	0.0	4.0	0.2	79.3	0.0
14	DMU85	205751.0	0.1	0.0	0.2	0.0	2.3	0.1	53.5	0.0
15	DMU86	800378.0	1.0	1148926.0	0.0	0.0	5.1	0.3	104.5	0.0
16	DMU87	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	DMU88	309270.0	0.0	282.0	0.0	0.0	1.6	0.5	39.8	0.0
18	DMU89	511469.0	0.6	0.0	0.2	19.4	5.7	0.3	113.2	0.0
19	DMU91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	DMU92	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	DMU93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	DMU97	0.0	1.7	403.6	0.3	90.2	0.0	12.5	106.6	0.0
23	DMU104	3153.9	0.8	2761714.0	0.1	0.0	34.3	0.0	18.3	4.6
24	DMU106	265594.0	0.0	2552679.0	0.0	292.5	25.6	0.0	0.0	245.9
25	DMU107	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	DMU109	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	DMU110	0.0	0.5	85684.8	0.0	0.0	0.0	0.3	69.1	0.0
28	DMU111	384994.0	0.0	3219643.0	0.8	0.0	3.4	0.0	117.2	0.0
29	DMU120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	DMU122	39833.3	0.0	1881839.0	0.1	0.0	26.0	0.0	69.1	0.0

Names of DMUs are in Appendix, Exchange Rate at the time of data collection ($1 = Uganda shillings-Ushs 3,600)

It is observed that DMUs which were found 100 percent efficient (see Table 4) have zero input and output slacks (see Table 5) and these include DMU54, DMU87, DMU91, DMU92, DMU93, DMU107, DMU109 and DMU120. This is because such health facilities are neither required to reduce their inputs nor augment their output. In other words, slacks exist only for those health centres identified as inefficient. It is evident that for example health facility DMU41 needs to reduce on its medical staff by one employee and cut down expenditure on drugs by Ushs2,910,901 (approximately $801), increase on ANC attendances by about 7 and HIV/AIDS tests by about 51 patients. In addition, DMU86 is required to reduce spending on its operational budget by Ugshs800,378 ($222), medical staff by 1 employee, expenditure on drugs by Ushs1,148,926 ($319) while augmenting on its health service outputs by 5 child deliveries and 105 HIV/AIDS counselling and none on laboratory tests. On the other hand, DMU106 can reduce on its operational budget and expenditure on drugs by Ushs265,594 ($74) and 2,552,679 ($709) respectively while augmenting by 293 child immunizations, 26 child deliveries, none of ANC attendances and HIV/AIDS counselling and testing, and 246 laboratory procedures.

Discussion: In Africa, it is not uncommon to find that most public health facilities are not very technical and scale efficient (Marschall, & Flessa, 2009; Kirigia et al., 2011; Zamo-Akono et al., 2013; Jarjue et al., 2015; Adil et al., 2016; Molem Christopher et al., 2017; Bundi, 2018). These prior studies compare well with the findings of the present study where mean technical and scale efficiency estimates were 0.723 and 0.995 respectively for health centre II facilities. According to Gebresilassie and Nyatanga (2017) most of the previous DEA studies done in the low and middle-income countries report a significant proportion of health facilities that are technically inefficient. For example a study by Kirigia et al. (2011) found that about 67 percent of the estimated community health centres in Sierre Leone were technically inefficient. In Kenya a related study by Kirigia et al. (2004) analyzed the TE of public health centres where results indicated that 56 percent of health centres were technically inefficient.

Another study in Latin America by Hernandez and Sebastian (2014) investigated the TE of health posts and found that about 53 and 29 percent were technically efficient in 2008 and 2009 respectively. A similar study by San Sebastian and Lemma (2010) estimated the efficiency of health posts in Ethiopia at a micro-regional level and showed that 75 percent of the health posts were technically inefficient while indicating significant

variations in technical efficiency scores across the health posts. In a comparison of other DEA studies with the present study, there is strong evidence of a large percentage of technically inefficient public health facilities in southwestern Uganda with significant variations in efficiency estimates. Most of the previous empirical DEA studies particularly in developing countries have indicated a very large proportion of scale inefficient health facilities. Results from the present study are closely related to the findings in the Gambia where 90 percent of the health centres were found to be scale inefficient (Jarjue et al., 2015). In Guatemala, about 44 percent of the health posts in 2008, and 65 percent of the health posts in 2009 were found to be scale inefficient according to Hernandez and Sebastian (2014). In Sierra Leone, it was found that only 36 percent of the health posts were scale inefficient (Kirigia et al., 2011). Another study by Renner et al. (2005) also in Sierra Leone finds that 65 percent of the health units were scale inefficient. More recent empirical findings in the Ethiopian health extension program by Gebresilassie and Nyatanga (2017) also agree with most studies in low-income countries where 91.3 percent of the health posts were found to be scale inefficient. Thus the findings from other countries are in agreement with the results of the present study of health centre II facilities in southwestern Uganda.

5. Conclusion

The study employed an output-oriented DEA to estimate levels of efficiency of 30 public HCII facilities in southwestern Uganda using cross-sectional data for the financial year 2015/16. The findings from the study indicate that there is mass inefficiency within public HCII facilities and as a result they incur high costs of production than if they were fully efficient. The study also estimated the amount of input reductions and output augmentations (economic savings) required to make inefficient HCII facilities efficient. The study found that there is a great potential for efficiency savings. The study further identified the inefficient and efficient HCII facilities with the purpose of benchmarking the efficient ones as role models for the inefficient ones. This helps in restructuring their operations and management because an improvement in performance enables better allocation and utilization of resources, minimizes costs of health production process and improves access to medical care. Apart from the significant contribution of this study to the limited literature on estimation of efficiency in Uganda, its application to the country's health service sector has potential policy implications. Since the majority of the health units are small, there is a need to augment their scale sizes and improve on their management practices so as to enhance their overall productivity and efficiency. The health sector should embark on rigorous, periodic research and development and enhance on the provision of basic healthcare services while utilizing the health input resources in an efficient manner.

This would lead health facilities to significantly improve on their efficiency and ensure universal health coverage across all communities in the region. There is a need for further analysis of health facility performance trends and more support to poorly performing health facilities using corrective measures which may range from increasing the amount of input resources both financial and non-financial in addition to more regular and frequent support supervision visits. All stakeholders should scale up efforts to attract, recruit, and align skills with needs and improve retention and motivation of the health workforce in a sustainable and comprehensive manner. Additionally, consolidated efforts in raising capacity and management of essential medicines and health supplies are needed. There is a need for comprehensive monitoring and evaluation (M & E) of the health sector development plan. In order for the implementation of the health sector plans, the Ministry of Health needs to develop M & E programs with key verifiable indicators and targets to monitor overall health sector performance. Therefore, a study of this nature serves as a powerful tool for guiding policy actions towards achieving the desired healthcare outcomes while maximizing returns from the present investment.

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APPENDIX: Population of Public Health Center II Facilities in Southwestern Uganda (N=84)

S/N	DMU No	HEALTH FACILITY NAME	RANK	TE	CRS TE	VRS TE	SCALE	RTS
1	DMU51	Katenga HCII	1	1.000	0.864	1.000	0.864	IRS
2	DMU54	KDA St Clinic HCII	1	1.000	1.000	1.000	1.000	CRS
3	DMU55	Kijurera HCII	1	1.000	0.851	1.000	0.851	IRS
4	DMU59	KMC St Clinic HCII	1	1.000	1.000	1.000	1.000	CRS
5	DMU65	Nyabushabi HCII	1	1.000	1.000	1.000	1.000	CRS
6	DMU67	Police Barracks HCII	1	1.000	1.000	1.000	1.000	CRS
7	DMU73	Bunagana HCII	1	1.000	1.000	1.000	1.000	CRS
8	DMU78	Gasovu HCII	1	1.000	0.901	1.000	0.901	IRS
9	DMU87	Nyakabande HCII	1	1.000	1.000	1.000	1.000	CRS
10	DMU90	Kaara HCII	1	1.000	1.000	1.000	1.000	CRS
11	DMU91	Butare HCII	1	1.000	1.000	1.000	1.000	CRS
12	DMU92	Ihunga HCII	1	1.000	1.000	1.000	1.000	CRS
13	DMU93	Ikamiro HCII	1	1.000	1.000	1.000	1.000	CRS
14	DMU95	Kagarama HCII	1	1.000	1.000	1.000	1.000	CRS
15	DMU96	Kashaasha HCII	1	1.000	1.000	1.000	1.000	CRS

16	DMU98	Kibuzigye HCII	1	1.000	1.000	1.000	1.000	CRS
17	DMU100	Kiyebe HCII	1	1.000	1.000	1.000	1.000	CRS
18	DMU101	Mpungu HCII	1	1.000	1.000	1.000	1.000	CRS
19	DMU107	Nyaruhanga HCII	1	1.000	1.000	1.000	1.000	CRS
20	DMU109	Bucundura HCII	1	1.000	1.000	1.000	1.000	CRS
21	DMU115	Kibanda HCII	1	1.000	1.000	1.000	1.000	CRS
22	DMU120	Kyerero HCII	1	1.000	1.000	1.000	1.000	CRS
23	DMU106	Nyamabare HCII	23	0.995	0.954	0.995	0.959	IRS
24	DMU45	Kahondo HCII	24	0.964	0.860	0.964	0.892	IRS
25	DMU104	Mushanje HCII	25	0.955	0.936	0.955	0.98	IRS
26	DMU49	Karujanga HCII	26	0.954	0.954	0.954	1.000	IRS
27	DMU79	Gisozi HCII	27	0.934	0.934	0.934	1.000	CRS
28	DMU103	Nangara HCII	28	0.931	0.931	0.931	1.000	CRS
29	DMU117	Kitojo HCII	29	0.886	0.886	0.886	1.000	CRS
30	DMU68	Nyamiryango HCII	30	0.849	0.849	0.849	1.000	CRS
31	DMU97	Kagunga HCII	75	0.835	0.835	0.835	1.000	CRS
32	DMU44	Kafunjo HCII	32	0.834	0.834	0.834	1.000	CRS
33	DMU111	Ibumba HCII	33	0.829	0.807	0.829	0.974	IRS
34	DMU122	Noozi HCII	34	0.811	0.791	0.811	0.975	IRS
35	DMU102	Mugyera HCII	35	0.810	0.810	0.810	1.000	CRS
36	DMU52	Kavu HCII	36	0.792	0.792	0.792	1.000	CRS
37	DMU84	Bigungiro HCII	37	0.785	0.785	0.785	1.000	CRS
38	DMU74	Chibumba HCII	38	0.761	0.720	0.761	0.946	IRS
39	DMU48	Kasheregyenyi HCII	39	0.743	0.708	0.743	0.952	IRS
40	DMU94	Kabere HCII	40	0.738	0.738	0.738	1.000	CRS
41	DMU76	Gapfurizo HCII	41	0.726	0.726	0.726	1.000	CRS
42	DMU41	Buramba HCII	42	0.707	0.707	0.707	1.000	CRS
43	DMU56	Kigata HCII	43	0.678	0.678	0.678	1.000	CRS
44	DMU75	Busengo HCII	44	0.677	0.669	0.677	0.989	IRS
45	DMU61	Kyobugombe HCII	45	0.673	0.638	0.673	0.948	IRS
46	DMU69	Nyanja HCII	46	0.669	0.658	0.669	0.983	IRS
47	DMU70	Rusikizi HCII	47	0.667	0.667	0.667	1.000	CRS
48	DMU42	Habubale HCII	48	0.660	0.660	0.660	1.000	CRS
49	DMU105	Shebeya HCII	49	0.642	0.639	0.642	0.995	IRS
50	DMU82	Maregamo HCII	50	0.610	0.610	0.610	1.000	CRS
51	DMU50	Karweru HCII	51	0.597	0.597	0.597	1.000	CRS
52	DMU116	Kitanga HCII	52	0.589	0.589	0.589	1.000	CRS
53	DMU121	Rwanjura HCII	53	0.579	0.579	0.579	1.000	CRS
54	DMU66	Nyakasharara HCII	54	0.564	0.564	0.564	1.000	CRS
55	DMU46	Kanjobe HCII	55	0.553	0.553	0.553	1.000	CRS
56	DMU86	Mulehe HCII	57	0.545	0.545	0.545	1.000	CRS

57	DMU110	Ibugwe HCII	56	0.545	0.545	0.545	1.000	CRS
58	DMU99	Kigazi HCII	58	0.528	0.528	0.528	1.000	CRS
59	DMU47	Kahungye HCII	59	0.523	0.523	0.523	1.000	CRS
60	DMU83	Mburabuturo HCII	60	0.499	0.499	0.499	1.000	CRS
61	DMU62	Mwanjari HCII	61	0.497	0.497	0.497	1.000	CRS
62	DMU60	Kyasano HCII	62	0.496	0.496	0.496	1.000	CRS
63	DMU77	Chihe HCII	63	0.473	0.471	0.473	0.996	IRS
64	DMU43	Kabindi HCII	64	0.450	0.450	0.450	1.000	CRS
65	DMU113	Kandago HCII	65	0.437	0.437	0.437	1.000	CRS
66	DMU118	Kitunga HCII	66	0.434	0.434	0.434	1.000	CRS
67	DMU119	Mukyogo HCII	67	0.427	0.419	0.427	0.98	IRS
68	DMU71	Rwene HCII	68	0.419	0.406	0.419	0.969	IRS
69	DMU114	Karorwa HCII	69	0.405	0.405	0.405	1.000	CRS
70	DMU81	Kalehe HCII	70	0.395	0.395	0.395	1.000	CRS
71	DMU89	Zindiro HCII	71	0.395	0.395	0.395	1.000	CRS
72	DMU123	Rwenyangye HCII	72	0.392	0.392	0.392	1.000	CRS
73	DMU108	Kaf-Nyakarmbi HCII	73	0.387	0.372	0.387	0.961	IRS
74	DMU112	Kahama HCII	74	0.385	0.385	0.385	1.000	CRS
75	DMU80	Kagunga HCII	31	0.384	0.384	0.384	1.000	CRS
76	DMU88	Nyamatsinda HCII	76	0.358	0.358	0.358	1.000	CRS
77	DMU58	Kitooma HCII	77	0.353	0.345	0.353	0.978	IRS
78	DMU63	Muyumbu HCII	78	0.325	0.325	0.325	1.000	CRS
79	DMU72	Rutooma HCII	79	0.293	0.293	0.293	1.000	CRS
80	DMU85	Muganza HCII	80	0.279	0.279	0.279	1.000	CRS
81	DMU57	Kisaasa HCII	81	0.277	0.264	0.277	0.955	IRS
82	DMU40	Burambira HCII	82	0.250	0.250	0.250	1.000	CRS
83	DMU53	Kicumbi HCII	83	0.243	0.243	0.243	1.000	CRS
84	DMU64	Ndorwa Prison HCII	84	0.165	0.165	0.165	1.000	CRS