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PERFORMANCE OF COUNCIL DESIGNATED HOSPITALS (CDHS) IN TANZANIA: DOES EXPERIENCE MATTER?

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ABSTRACT

This study attempts to shed light on the performance of CDHs based on experience. It examined efficiency and total factor productivity of 17 CDHs from 2009 to 2013. The study employs non-parametric approaches to estimate efficiency and productivity. Result records that new CDHs were performing relatively better than experienced CDHs and the productivity change was largely derived by growth or regress in technical change. Using Mann-Whitney-U test we rejected the null hypothesis that the distribution of technical efficiency was equal across new and experienced CDHs since P -value was less than 5%. The paper suggests that policy makers, government, and hospitals owners should invest in new technology as main deriving factor of productivity in CDHs. Conclusively, this paper holds that experience of operating as CDHs does not matters when it comes to improvement of hospitals' efficiency. Interestingly, experience of operating as CDHs does not necessarily imply superiority in the performance.

Keywords: *Performance, Council Designated Hospitals, Experience, Tanzania.*

INTRODUCTION AND BACKGROUND OF THE STUDY

The United Republic of Tanzania (URT) comprises Tanzania mainland and the state of Zanzibar. This study focused on the Tanzania mainland where faith-based and volunteering agency hospitals (VAHs) largely operate. The number of people in Tanzania mainland is 43.6 million of which 21.2 million are females, and 22.4 million are males (URT – Census result, 2012). According to WHO (2015), 30% of the country's total population is living in urban or semi-urban areas and the remaining reside in the countryside, it is also estimated that 45% of the population is aged under 15 years while only 5% aged over 60 years. Public hospitals play central components of the health system in Tanzania, accounting for 64% of the total hospitals in the country (MoHSW, 2011). However, due to the small number of public district hospitals particularly in rural areas, the government has been using faith-based hospitals as the council/ district designated hospitals. Like in many developing countries, the government of Tanzania has been facing difficulties and numerous challenges in providing adequate health services, particularly to the rural communities. This is evidenced by the fact that most of the public health facilities are situated in urban or semi-urban areas. Therefore, contracting delivery of health services has been attractive in rural areas where the government has inadequate or no health facilities to serve the rural communities. In rural areas, private sector particularly faith-based organizations are believed to have relatively many health facilities compared to their public sector counterpart.

Contracting of Health Services

Private not for profit hospitals registered with the ministry of health and social welfare (MoHSW) are in national health map, the majority of which are owned by faith-based organizations and they benefit from direct and indirect support from the government. Private not for profit hospitals are classified into two categories, that is Voluntary Agency Hospitals (VAHs) and Council Designated Hospitals (CDHs). Voluntary Agencies Hospitals (VAHs) category is the group under which all accredited faith-based hospitals fall. The VAHs have potentially been involved in the contracting processes since the year 2007, this lead to the establishment of the service agreements between the public sector and private sector. Service agreements stipulate series of operating criteria linked to support from the government which require either achievement of specified fixed objectives or performance indicators. If there is no service agreement stipulating the arrangement, the VAHs are entitled to limited support from the basket fund managed by local government. Council Designated Hospitals (CDHs) are VAHs officially designated (by contract) to operate as councils or districts referral health facilities. They (CDHs) enjoy both Block grant of the ministry of health and Basket fund.

Contracting in health care delivery may take various forms depending on the extent to which the parties shares risks and responsibility. The bottom line of the Partnership between government and private sector is characterized by sharing of risks, objectives and rewards (Nikolic and Maikish, 2006). Service contract is signed between the public and private sector (partners to the partnership) for the provision of a specified health services, the aim being to leverage comparative advantages and strength of a private partner (such as improvement in efficiency or quality of healthcare) (Nikol and Maikisch, 2006). Literature shows that since the 1970s and 1980s contracts and contracting in public sector management reforms have become the major themes in many countries (Palmer, 2000). Like in other countries, Contracting is one of the major tools being used to enhance the performance of health services delivery in Tanzania. The use of private not for profit (particularly faith-based hospitals) to provide health services and operate as the district or council referral hospitals is one of the examples of contracting in health services in Tanzania. Moreover, it (contracting) is importantly considered as the strategy through which systematic, and the government expands their attention in the health sector (Boulenger and Criel, 2012). As Giutsi, Criel and Bethune (1997) Contended, contracting can be viewed as an instrument to integrate private not for profit hospitals, guided by the public sector in National healthcare delivery system. Boulenger and Criel (2012) argued that there are several types of contractual relationship, some based on whether it involves public or private, others on the parties involved and yet others based on the scope of the contract (items covered in the contract).

System of Health care in Tanzania before and after Reforms

Tanzania government is the primary provider of the health services and own approximately 64% of health facilities in the country while the private not for profit (PNFP) particularly faith-based and voluntary organizations is the second biggest (MoHSW, 2011). Collaboration between the public sector and religious organizations in health services started after independence and ties created the Tanzania model known as the *'Public and faith-based collaboration.'* In such collaboration faith-based hospitals played a crucial role in health services provision particularly in rural-isolated communities. Due to decentralization and adoption of the pyramidal health system in 1972, a number of faith - based hospitals were given District designated hospitals (DDHs) status sealed by formal contract. The move enabled the government to compensate the shortage of public health facility in rural areas while avoiding duplication (Belonger and Criel, 2012).

In the 2000s, the memorandum of understanding (Moue) involving private not for profit (PNFP) and public sector were negotiated. Moreover, the old DDHs contract models were also reviewed in 2005 in accordance with the government decentralization policy and allowed the creation of the new type of operation contract in 2007. Further steps gradually led to the adoption of the public-private partnership (PPP) model in health services delivery as an official policy (MoHSW, 2011).Christian's faith-based health sector today is represented in the public health platform by Christian Social Services Commission (CSSC) with its five zonal offices. Christian Social Services Commission (CSSC) supports the provision of health services using partnerships, lobbying, and advocacy in a manner that ensures transparency, quality, equity, availability and accessibility to all Tanzanians. The delivery of health services is done through facilities of members (a faith-based organization) that are spread all over the country. These facilities are at present accounting for approximately 13% of all health facilities in the country, and they are coordinated by the Zonal managers, Zonal Coordinators, and the Lead Agents in the respective administrative areas *(http://www.cssc.or.tz/node/299).*

Generally, The use of Partnership arrangements in public services provision has remained attractive to the public sector, as they have shown the value for money (VfM), high-quality outcome, on time result and on budget provision (Yuan et al., 2012).In Tanzania, the use of partnership arrangements in health services delivery has been related to sharing of operating and administrative cost between the government and private sector. Additionally, objectives of Partnerships also include the transfer of risks to the private partners, solving the problem of budget constraints in the public sector while ensuring quality and efficiency in the provision in the of health services.

Hospitals Efficiency and Productivity

In this study hospitals performance signify an improvement in hospitals efficiency and productivity with regards to management of hospitals resources, in other words, it shows the extent to which hospital ability to manage resources has increased. In other words, it is also known as technical efficiency (optimization of hospitals resources to produce outputs). Generally, hospitals performances influence the performance of entire health system. Therefore, there is an

increasing concern about hospitals performance (Mc Keen and Healy, 2002). Literature shows that inefficient use of the hospitals resources affects the provision of the health services to the targeted population, causing the demand and cost crisis in the health sector (Yaisawarng, 2002; Ducket, 2003). To shed lights on the value of health services (hospitals outputs) to be obtained from a given available resources the study on hospitals efficiency (technical efficiency) has been amplified in recent decades. Generally, efficiency (technical) implies the relationship between the outputs and inputs (resources used in producing health outputs). Inefficiency is reflected by low technical efficiency scores and it implies poor management of hospitals resources (i.e. the use of specialist for activities that can be performed by nurses, misuse of medical equipment/ technology or lack of hospitals productivity (Farzian pour et al., 2011; Flouku et al., 2011; Barnum et al, 2009).

Productivity measures the relationship between outputs of hospitals and the health system inputs that have been spent in producing the outputs. Hospitals productivity is said to have improved if the outputs per health worker are growing and /or there is the use of more and better employment of health technology. In general hospitals, productivity index is explained as the ratios of outputs quantity index to an input quantity index. Since we are using panel data, we employed Malmquist –DEA to determine indices of changes in total factor productivity (TFP), technology, technical and scale efficiency. Malmquist Productivity Index (MPI) was developed by Caves et al. (1982) to measure the total factor productivity (TFP) change between two data points using ratios of distance functions, Malmquist DEA has been employed to panel data to estimate indices of changes in total factor productivity (TFP), technology, technical efficiency and scale efficiency. Malmquist productivity index (MPI) can take the value of 1, less than 1 or greater than 1 if there is stagnation in productivity growth, deterioration in productivity or growth in productivity respectively.

Literature also regards productivity as the measure of the efficiency change between the two periods. If the hospital is technically efficient in two periods, the productivity change between these two periods will consist solely of 'technical change' of shift in the best practices frontier, in the two periods, the productivity change will be composed of net change in output due to change in efficiency (or change in how far the hospital is from the frontier) and technical change (or shift in the frontier).

Objective and Significance of the Study

Generally, the purpose of this study was to examine how experience of operating as Council Designated Hospitals (CDHs) influences the hospitals' performance. In this study, by hospitals performance we mean efficiency and productivity improvement. General objective has been built on the study by Pharm (2011), where hospitals' performance in Vietnam were measured using efficiency and productivity. Generally, the study aims at computing the trend of efficiency and productivity of council designated hospitals (CDHs). Specifically, the study aims at:

i. Testing significance of efficiency difference between experienced Council Designated Hospitals (CDHs) and new Council Designated Hospitals (CDHs).
ii. Examining total factor productivity of the experienced CDHs and new CDHs

The study is significant since the result will be able to indicate the impact of experience on resource utilization (management of resources). In this regard experience matters if there is differences in terms of technical efficiency performance between hospitals which converted from VAHs to CDHs in the 1970s, 1980, 1990s (experienced CDHs), and those which had just turned from the VAHs into CDHs in recent years in 2000s (new CDHs). The result of the study will be useful to both the policy makers and hospitals owners, particularly in the aspect of resources planning. The study is also important since it tells what should be done in each category to bring inefficiency hospitals back to their benchmark level. Such analysis is paramount to administrators (or managers) of inefficient hospitals. This paper consists four sections, *introduction and background* of the study is presented in section one, section two presents *methodology* or techniques used in the study. *Result and discussion* presented in section three, and section four include the *conclusion and Recommendation.*

METHODOLOGY

Council designated hospitals (CDHs) are good examples where the public and private sector work together (particularly share the cost and other resources) in the provision of health services. Tanzania has 36 faith-based hospitals operating as the council designated hospitals (CDHs). This study employed 17 CDHs to assess how the impact of experience in partnership arrangement influence hospitals performance.These17 council designated

hospitals (CDHs), were examined over the sampled period of 2009 -2013. Two categories were involved in the analysis, *experienced CDHs* (converted from VAHs to CDHs in the 1970s, 1980s, and 1990s) and *new CDHs* (converted from VAHs to CDHs in 2000s). Dataset was extracted from the annual reports of respective hospitals. Data collected was summarized and analyzed using the *Max DEA 5* to compute efficiency and, *DEAP 2.1 Software* to determine the hospitals' productivity.

Experienced CDHs included in this study were Biharamulo, Bunda, Huruma, Kilema, Rubya hospitals. Others are Sengerema, Sikonge, Sumve and Muheza hospital. While the new CDHs involved under scrutiny are Ilula, Makiungu, Mbalizi Evangelism, Peramio hospitals. Other hospitals under this category were Tosamaganga, Turiani, Mvumi, and ST. Gema hospitals.

According to Nyhan and Peter (2000), selection of inputs and outputs is the most crucial stage of the analysis when using the DEA model. Upon selection of the variables, Malmquist –DEA aggregates the inputs and outputs into a composite index of overall performance standard (Min et al., 2009). In this study the variables (inputs and outputs) were selected based on several interview with hospitals administrators and extension of previous similar studies conducted by Pharm (2011) on hospitals efficiency and productivity in Vietnam.

Inputs and outputs employed in the study are presented in **Table 1** below.

Table 1: Input and Output Variables for DEA

Outputs	**Output operational definitions**
Total inpatients Days (Y_1)	Total number of days that inpatients stayed on hospitals' bed receiving inpatients services during the year (2009-2013)
Total outpatients visits (Y_2)	Total number of outpatients visited the department (2009-2013)
Surgical operation (Y_3)	Total inpatient and ambulatory Surgical operation (2009 -2013)
Inputs	**Inputs operational definitions**
Hospitals beds (X_1)	Total number of used hospital beds during 2009-2013
Full-time Equivalents (X_2)	Total Doctors and number of full-time physicians 2009-2013

Efficiency Estimation and Model Selection

Improvement in hospitals efficiency is the major challenge as far as strategy for resources mobilization and health care delivery isconcern. It is therefore, important to ensure optimal use of the existing scarce health care resources. From the concept of Pareto optimality, it is important to make sure that there is no way reallocation of available health resources can improve one person's health without making another person's health status worse off.

Data Envelopment Analysis (DEA) has been widely applied in measuring performance in public sector organizations (such as hospitals) and where there are multiple inputs and outputs (Charnes, Cooper, and Rhodes. 1978). DEA is the piece-wise linear convex hull methods to frontier estimation, initially proposed by Farrell (1957). The method has been productively employed in many countries in Asia, Europe and North America so as to shed light on the hospital's efficiency. Moreover, a few numbers of such studies have been conducted over recent decades in sub-Saharan African countries. Charnes, Cooper and Rhodes (1978) proposed the *CCR model* that assumes input-oriented and Constant Return to Scale (CRS), in subsequent articles different authors have considered an alternative set of assumptions, such as Banker, Charness and Cooper (1984) proposed the *BBC model* that assumes variable returns to scale (VRS). The variable return to scale model was proposed to allow computation of scale efficiency. It was built on the assumption that change in inputs would lead to disproportionate changes in outputs. Scale efficiency is given by the ratio of constant return to scale efficiency (TE_{CRS}) to the ratio of variable return to scale efficiency (TE_{VRS}).

Therefore using DEA approach we assumed an input-oriented model with variables returns to scale (VRS) to measure technical efficiency scores of CDHs hospital based on experience. With inputs oriented model, hospitals managers have no control over outputs. Therefore, it implies that hospitals' outputs are given and it can be produced by varying level of inputs.

TE can be calculated by solving the following DEA LP problems.

Min λ_j, such that:

$$\sum_{j=1}^{n} \lambda j Yrj \geq Yro, \text{ (r=1……n)}$$

$$\sum_{j=1}^{n} \lambda i Xij \leq \theta Xio \text{ , (i= 1 , 2)}$$

$$\sum_{j=1}^{n} \lambda j = 1, \lambda j \geq 0 \text{ (j = 1…..n)}$$

The objective of the Linear Programming problem is to find the *Min λj* that particularly minimizes inputs vector to Θ *Xio*, while guaranteeing at least the output level of *Yro.*

Hypothesis formulation

In this study the focus is to test if the experience of operating as Council District Hospitals (CDHs) has a significant impact on the efficiency improvement. To perform the test we use efficiency scores from two different samples (experienced CDHs and new CDHs), and conduct the *Mann-Whitney U test* to test the significance of the efficiency difference between the two samples. *Mann-Whitney U test* is a distribution-free test, used to compare two distinct samples when the assumption of normality of distribution of the sample failed. We conducted the normality test using the *Shapiro-Wilk W* as well as using *Kurtosis –Skewness test* and found that distribution does not follow a normal distribution. Rejection of the null hypothesis will imply that experience of operating as CDHs does not matter if the new CDHs outperform the experienced CDHs. Therefore using *Mann-Whitney U test* we tested the hypothesis that:

Ho:Mean distribution of Technical efficiency score is equal across new CDHs and experienced CDHs
H1: Mean distribution of Technical efficiency is not equal across the group of new CDHs and experienced CDHs

Productivity estimation technique

DEA –based Malmquist productivity index was employed as productivity estimation technique. The method was originally developed by *Stem Malmquist* (Malmquist, 1953) who applied it to the analysis of consumer theory. Following the work of Caves et al. (1982) the MPI was advanced and enforced in measuring productivity. Malmquist productivity index (MPI) may be defined as follows:

$$M_o\left(x^t, y^t, x^{t+1}, y^{t+1}\right) = \left[\frac{D_o^t\left(x^{t+1}, y^{t+1}\right)}{D_o^t\left(x^t, y^t\right)} \frac{D_o^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D_o^{t+1}\left(x^t, yt\right)}\right]^{1/2}$$

Moreover, from the spirit Nishimizu and Page (1982) as well as Färe et al. (1994; 1994a) the MPI is decomposed into efficiency change (ECH) and technology change (CTH) as follows:

$$M_o\left(y^{t+1}, x^{t+1}, y^t, x^t\right) =$$

$$\left[\frac{D_0{}^{t+1}(x^{t+1}, y^{t+1})}{D_0{}^t(x^t, y^t)}\right] x \left[\frac{D_0{}^t(x^{t+1}, y^{t+1})}{D_0{}^{t+1}(x^{t+1}, y^{t+1})} * \frac{D_0{}^t(x^t, y^t)}{D_0{}^{t+1}(x^t, y^t)}\right]^{1/2}$$

EFFCH * TECH

Where D represents the distance functions, M_o is the output oriented Malmquist productivity index. The efficiency change**(EFFCH)** term is given by ratio of Farrell technical efficiency in period period*t+1* divided by Farrell technical efficiency in period *t*. the technological change**(TECH)** implies the geometric mean of the shift in technology as observed at $\left(x^{t+1}, y^{t+1}\right)$ **(**first ratio in the bracket) and a shift in technology observed at $\left(x^{t}, y^{t}\right)$ (second ratio inside bracket). The EFFCH component is greater than, equal to, or less than unity depending on whether the efficiency of the evaluated hospital improves (catching the frontier effect), stagnates, or declines. This will depend on the case. However, the TECH may also take a value greater than, equal to or less that unity in order to make the technological change positive, zero or negative respectively.

RESULT AND DISCUSSION

Efficiency results

The summary of average technical and scale efficiency scores are provided in **Table.2**below. Out of nine experienced CDHs hospitals, five hospitals had efficiency scores of 1 in pure technical efficient (VRS). The performance was poor in the aspect of technical efficiency (CRS), most of experienced CDH- hospitals were operating far away below the efficiency frontier (efficiency score of 1) as most of them had efficiency score ranging between 0.22 (22%) and 0.77.4 (77.4%), Mean CRS and VRS technical efficiency of experienced CDHs were 45% and 53.7% respectively. On the other hand, their mean scale efficiency was 88% which means most of these hospitals were operating close to scale efficiency score of 100% (close to their optimal size) since the range between the minimum and maximum efficiency score was 69% and 99%. Most of these hospitals became CDHs in the late 1970s and early 1980s and 1990s, which means they are more experienced in operating as the district designated hospitals in their areas.

New CDHs are hospitals which entered into arrangements with the government to be CDHs in recent years (most of them became CDHs between 2006 and 2008). Out of eight new CDHs hospitals, only four (50%) of them were operating technically efficient (CRS). However, the mean variation in terms of the technical efficiency (VRS) scores was very significant in New CDHs; the minimum was 0.266 (26.6%) while the highest was 1 (100%).

When compared to previous studies, mean technical efficiency (VRS) score of experienced CDH 53.7% was less than the technical efficiency of 61% Zambian hospitals (Masiye, 2007), and less than the technical efficiency of 61% measured in Ghana,(Osei et al., 2005). Mean technical efficiency (VRS) of new CDHs was 72.4 %, which is higher than the range of technical efficiency of 65.8% - 67.5% found in Angola (Kirigia et al., 2008), it also fall into the range of 63.3% - 85.8% found in Benin (Kirigia et al., 2010) and the range between 62.7% - 74.3% of Namibia (Zere et al., 2006). Both technical efficiency (VRS) score of new CDHs and experienced CDHs of 53.7% and 72.4% was less than the range of 90.2 – 97.3% found in Uganda (Yawe, 2008).

Generally, the size of the hospital or the scale at which it operates may sometimes cause inefficiency as this may take the form of increased returns to scale or decreasing returns to scale (Jehu-Appiah et al., 2014) - therefore we used DEA and determined the scale efficiency of each category of hospital under the study. Summary of the findings are presented in **Table 2.** Findings revealed that none of the experienced hospitals portrayed scale efficiency score of one. However, observation showed that most of these experienced CDHs hospitals were operating close to efficiency score of one, as depicted in **Table 2**the difference between the scale efficiency was ranging from a minimum of 0.6898(68.9%) to maximum of 0.999433(99.9%). This implies that variation in the performance with regards to hospitals size is not much big, and most of them are performing closed to their optimal size.

Table 2: VRS Technical Efficiency and Scale Efficiency CDHs (2009 – 2013)

Hospital status /category	Observations	Mean (VRS) Score (%)	Std dev.	Min	max	Hospitals of frontier
Experienced-CDHs(09)						
Technical efficiency(CRS)	45	.4503613	.1547552	.217879	.77453	00(00%)
Pure-technical efficiency(VRS)	45	.5373447	.2425187	.246269	1	05(55%)
Scale efficiency	45	.8793362	.1102079	.689825	.99943	00(00%)
New CDHs(N=08)						
Technical efficiency(CRS)	40	.6691678	.2412217	.257173	1	04(50%)
Pure-technical efficiency(VRS)	40	.7238869	.2237908	.266597	1	06(75%)
Scale efficiency	40	.9174543	.0944383	.701326	1	04(50%)

Source: Research Findings, 2015

Out of eight (8) new CDHs, only four (50%) were scale efficient. This means they were operating at their optimal size. In this aspect, the hospitals are neither too large nor too small for their level of operation (volume of activities). The attempt to increase the size of the hospitals beyond this level may make the hospitals become large compared to their level of activities and hence start experiencing *diseconomies of scale.* Results also showed that the difference in the hospitals scale efficiency under this category was from the minimum of 0.7013 (almost 70.13% and a maximum of 100%), and most of them were operating close to their optimal size compared to experienced CDHs. Mean scale efficiency of the experienced CDHs and new CDHs were 87.6%, 91.7 %, respectively. When compared to previous studies, mean scale efficiency score of experienced CDH 87.6% is within the range of scale efficiency score of 81%-89% in Angola (Kirigia et al., 2008), it also falls within the range of 82.5% - 90% in another study conducted in South Africa by Zere et al., (2001).On another hand new CDHs manifested the mean scale efficiency score of 91.7%, when compared to previous studies, the score is higher than mean scale efficiency of 90 % in Kenya (Kirigia et al., 2011). However, the score is less than 95.3% of Kwazulu Natal(Kirigia et al., 2000) and less than mean scale efficiency of 97.5 % in Uganda, (Yawe, 2008). Therefore, mean scale efficiency scores of experienced CDHs and new of 87.6% and 91.7% implies that each category of hospitals has the scope to increase total outputs/activities by approximately 12.4% and 8.3% respectively. Therefore, 75% of new CDHs in Tanzania were run efficiently between 2009 and 2013, less than result revealed in the study by Totledo et al. (2010) where it was concluded that over 70% of the district hospitals in Botswana were run inefficiently between 2006 and 2008.

Hypothesis Testing Result

The test was carried out using the non-parametric hypothesis testing technique known as *Mann-Whitney U test* (we used STATA.10). It does not assume any properties regarding the distribution of the underlying variables in the analysis. This assumption makes this approach suitable for this particular hypothesis testing, as it is the best test to compare distribution when the dependent variable is not normally distributed. We test the null hypothesis that mean technical efficiency scores are equally distributed across new CDHs and experienced CDHs against the alternative hypothesis that they are not equally distributed across the two categories. The method has been used in the study by Chang and Lan (2010) in testing the impact of use of national health insurance program to the hospitals efficiency in Taiwan. *Mann-Whitney U* test has also been used in the study by Chilingerian (1995) to test the physicians' efficiency in US hospitals. This hypothesis testing tries to respond to research objective number one in this paper, which requires testing significance of efficiency difference between the new CDHs and experienced CDHs.

Table 3: Wilcoxon Rank Sum (Mann –Whitney U test) Result

```
Two-sample Wilcoxon rank-sum (Mann-Whitney) test

newandexpe~s |       obs       rank sum    expected
-------------+---------------------------------
           1 |        45          1499        1935
           2 |        40          2156        1720
-------------+---------------------------------
    combined |        85          3655        3655

unadjusted variance     12900.00
adjustment for ties        -4.41
                        ----------
adjusted variance       12895.59

Ho: techni~s(newand~s==1) = techni~s(newand~s==2)
                 z =   -3.839
           Prob > |z| =    0.0001
```

From the result in **Table 3** (STATA 10), we reject the null hypothesis that the distribution of the mean technical efficiency score is equal across categories of new CDHs and experienced CDHs hospitals since the probability is 0.0l% which is less than 5% level of significance. The result is also consistent with the findings in **Table 2**, where it was revealed that on average 75% of New CDHs were technically efficient compared to 55% of experience CDHs which were run efficiently. However, the experienced CDHs showed high instability in the technical efficiency (VRS) compared to new CDHs since they have high standard deviation 24.2% compared to 15.4% of new CDHs. The result from the hypothesis testing implies that experience of operating as CDHs does not matter. Further, it does not necessarily imply hospitals' superiority in performance (efficiency and productivity).

Productivity Results

Productivity change of new CDHs and experienced are summarized in **Table 4**.WhenVAHs hospitals that changed to CDHs in recent years were compared to the experienced CDHs. Results show that new CDHs were performing relatively better in terms of annual productivity compared to experience CDHs, particularly in the first two years. Findings also revealed that new CDHs exhibited annual productivity improvement of 7.4 percent and 5.1 percent against – 1.2 percent and 1.8 percent of experienced CDHs in the year 2009/10 and 2010/11 respectively. In the year 2011/12 and 2012/13 both categories of hospitals were experiencing deterioration in annual productivity. However, annual productivity change of experienced CDHs gained momentum in year 2012/13, and it was coming closer to the index of one. Total factor productivity of experienced CDHs deteriorated by 2.2 percent due to regress (deterioration) in technical efficiency change by 2.3 percent that could not be counterbalanced by small improvement of 0.2 percent in technical change in that category. Meanwhile, new CDHs have total productivity factor of 1.003 largely caused by technical change improvement of 1.3 percent, which counterbalanced the regress of 1 percent in the efficiency change.

Table 4: Productivity Index of Experienced CDHs & New CDHs

Experienced CDHs						**New CDH**					
YEAR	EFF CH	TECH CH	PEC CH	SCALE EFF	**TFP CH**	YEAR	EFF CH	TECH CH	PEC CH	SCALE EFF	**TFP CH**
2009/10	0.954	1.036	1.032	0.924	**0.988**	2009/10	0.967	1.110	0.966	1.001	**1.074**
2010/11	0.962	1.058	0.976	0.986	**1.018**	2010/11	0.975	1.078	0.989	0.986	**1.051**
2011/12	1.044	0.877	1.002	1.042	**0.916**	2011/12	1.071	0.881	1.059	1.011	**0.943**
2012/13	0.950	1.047	1.013	0.938	**0.995**	2012/13	0.952	0.999	0.923	1.032	**0.952**
MEAN	0.977	1.002	1.006	0.971	**0.978**	MEAN	0.990	1.013	0.983	1.008	**1.003**

In this comparison, the year 2009/2010 is considered as the technology reference when using the Malmquist total factor productivity in comparing the annual productivity change of new CDHs against the experienced CDHs. **Figure .1** below represent the graph showing productivity change for the two categories.

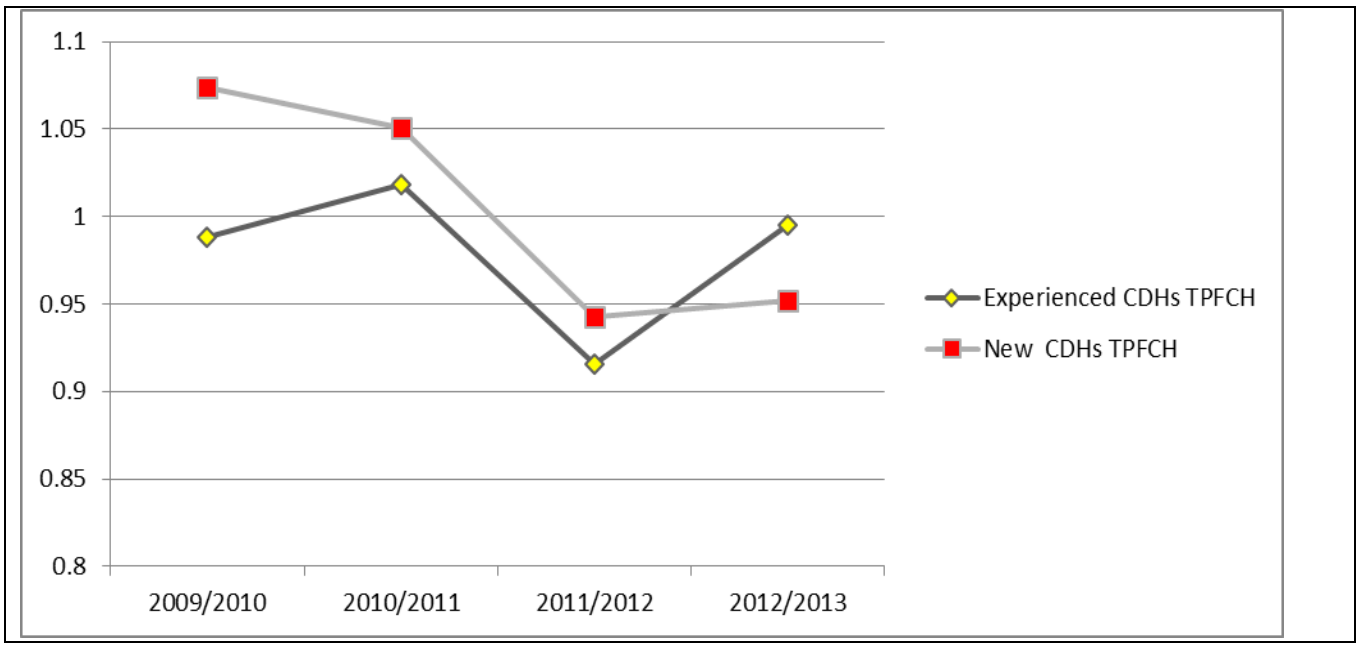

Figure 1: Productivity Change of New CDHs and Experienced CDHs.

Analysis of overall productivity analysis of the two groups shows that productivity of new CDHs was relatively higher than that of experienced CDHs in the first three years. However, the trend changed in the year 2012/2013 when the productivity of experienced CDHs was above that of new CDHs. For example, in 2009/10 new CDHs was experiencing positive improvement in productivity by 7.4% (1.074) while the experienced CDHs category was experiencing regress with index of 0.988, in the year 2010/11 experienced CDHs portrayed the improvement in productivity with index of 1.018 (growth of 1.8%) while new CDHs manifested productivity index of 1.051 (growth of 5.1%). TFP in the two groups were above 1 in the second year of comparison; thereafter the two groups manifested the declining trend (below 1) in third year (2011/12). Though the two groups depicted declining trend, new CDHs were still depicting relatively higher productivity index as compared to experienced CDHs. However, in year 2012/13 the experienced CDHs manifested greater productivity index 0.995 (almost close to one) compared to new CDHs index of 0.952.

CONCLUSION AND POLICY IMPLICATION

This study examined if the experience of operating as council designated hospitals (CDHs) matters with regards to the performance of council designated hospitals (CDHs) in Tanzania. We used DEA (to gauge efficiency) thereafter we conducted Mann-Whitney –U test to test the equality of technical efficiency distribution across new CDHs and experienced CDHs. We also used Malmquist Productivity Index (MPI) to measure CDHs productivity. Results from this study record that new CDHs were performing relatively better than experienced CDHs in the aspect of technical efficiency for the first three years before the latter outperformed the new CDHs in the fourth year. All experienced CDHs considered in this study were not operating at their optimal scale (size). On the other hand, a half of new CDHs were operating at their optimal scale (size). This implies that both categories (new and experienced CDHs) still have a room to adjust their sizes so as to operate at optimal size. Specifically, only a half of new CDHs are required either to scale up or scale down their sizes to become scale efficient. On the other hand all experienced CDHs are required to scale-up or down to become scale efficient (operate at optimal scale). Using *Mann-Whitney* - U test we rejected the null hypothesis that the distribution of technical efficiency was equal across new CDHs and experienced CDHs since P - value (0.0001) was less than 5%. This implies that experience of operating as council designated hospitals (CDHs) matters with regards performance of CDHs in Tanzania.

As far as mean productivity is concern result revealed that over the study period (2009/10 -2012/13) mean of total productivity change of new CDHs grow while that of experienced CDHs declines. It was noted that the decline in the later was largely caused by regress in efficiency change (catch up effect). The result implies that there is a problem in both categories of CDHs how they use the existing resources in order to moves towards or remain on efficiency frontier. Though new CDHs were performing relatively better in the first three years while in year four experienced CDHs seems to have improved their performance. However, the general direction of total factor productivity change in both categories has been identified as regress or growth in technical change.

Therefore, the study suggests improvement of management of hospitals resources (efficiency change) in both categories of CDHs. Generally, technical change (innovation) is the main driver of total productivity growth and is related to investment in new technology which leads to a shift in efficiency frontier. Therefore, the paper suggests to the policy makers, government, and hospitals owners to invest in new technology since over the study period (2009/10 – 2012/13) positive annual technological change were deriving the productivity growth in the first two years in both categories of CDHs. Conclusively, this paper holds that experience of operating as council designated hospitals does not matters as far as the performance (efficiency and productivity) of the council designated hospitals in Tanzania. More interestingly, the experience of operating as council designated hospitals (CDHs) does not necessarily imply superiority in the performance, particularly when new CDHs and experienced CDHs are compared. This study also suggests that future study and natural extension of this work should determine other factors that cause change or differences in the performance (efficiency and productivity) between experienced CDHs and new CDHs.

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Competing interests

The author declares that he has no any competing interests

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