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Technical efficiency of public hospitals in Togo: A directional distance function approach

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Abstract

Estimates indicate that 16% of the population applied for the service of doctors in 2011 in Togo. From 2008 to 2012, it was noted an average increase of patient deaths by 10%. The present study is aimed at looking at the issue of efficiency of public hospitals in Togo. We used the directional distance functions to analyze the technical efficiency of 139 public hospitals in Togo. The data were extracted from the annual reports of health activities of each hospital. These data were supplemented by visits and interviews with hospital officials. On average, 60.71% of large size public hospitals are technically inefficient. In these hospitals, only 41.45% of the beds were occupied in 2010. Furthermore, on average, 48.83% and 63.47% of paramedical and administrative staffs were actually employed in these hospitals. Nevertheless, outputs could be increased by 94.24% while maintaining inputs levels in Pediatrics services. The removal of the evaluation of agents funded from the autonomous budget and the lack of department heads in many health centers contribute to the increase of the technical inefficiency. The lack of qualified personnel and technical equipment, the dilapidated health infrastructures and the low financial affordability may explain these inefficiencies. The governance factors such as the effective management of human and technical resources should occupy a prominent place in the health development policies.

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1. Introduction

In order to achieve the Millennium Development Goals (MDGs), African countries have decided to improve the efficiency of their health care system, at the third ordinary session of the Conference of Ministers of Health of the African Union held in 2007. National systems should implement mechanisms to improve the performance of health personnel and care they provide. Through many speeches and policies, Togo is firmly committed to improving the health of its population. However, curative care is provided in deplorable conditions.

The review of budgets allocated to health reflects a budget shortfall. The percentage of the budget allocated to health dropped from 8.3% in 1991 to 4% in 2010 (Ministry of Health, 2010). These allocations are far from the commitments made by the Heads of States in Abuja Summit in 2000 which recommended an allocation of 15% of the general State budget to health. As a result, the health budget per capita did not increase considerably the last few years. From 2 507 FCA in 2005, the per capita health budget has increased to 2 904 CFA in 2006. It was estimated at 3 981 CFA in 2012 (Ministry of Health, 2012). These figures are quite inadequate in view of the estimated average cost of the Minimum Package of Activities (LDC). In Sub-Saharan Africa, the cost of a LDC Epidemiological is estimated between 7 000 and 9 000 CFA francs per year per capita (WHO, 2006).

Thus, an assessment of the state of health facilities that was conducted in Togo in 1995 showed that about 81% of them required simple renovation, rehabilitation or building work. But so far, the situation has not improved significantly (Ministry of Health, 2009). In most of the health facilities and services, equipment and materials are insufficient at all different levels of the system (Ministry of Health, 2009). Many of these health facilities are dilapidated. Moreover, the maintenance and upkeep of the buildings are inadequate and sometimes nonexistent. The existing medico-technical equipment is both inadequate and outdated (Ministry of Health and WHO, 2004). The equipment of cold logistics, particularly the kerosene containers, refrigerators, and freezers are generally insufficient for the needs and requirements of good immunization coverage pursued by national health policy (Ministry of Health and WHO, 2004). Similarly, infrastructures assigned to specific technologies such as biological analysis laboratories and blood centers are also of concern. In the annual report on the activities, in the district of Assoli, it is noted that in 2010, the Peripheral Health Units (PHU) located in rural areas lacked medical technical equipment. For example, some PHU have no transport equipment. In this regards, five focal points have no transport materials. These units are very often faced untimely with ruptures gas. Most of PHU have no laboratory.

The Togolese public health system is further characterized by a shortage of medical and paramedical staff in quantity and quality (Ministry of Health, 2009). Furthermore, it is noted an unequal distribution of medical and paramedical staff across the country. The richest region in Togo has approximately 83% of the medical and paramedical staff. Six other sanitary regions abounds only 17 % of the medical and paramedical staff (Ministry of Health, 2010). This disparity is also reflected at the hospital level. The University Teaching Hospitals (UTH) Sylvanus Olympio (SO) had 1 430 agent including 133 physicians and 507 paramedics, in 2010. By cons, the PHU Boulade had in 2010, only 3 agent including 1 practical nurse, a midwife and a sick guard.

These constraints have repercussions on the provision of health and the demand for health care. The health statistics clearly shows that there is an underuse of the main services provided at the health facilities. In 2011, estimates indicate that 16% applied for the service of doctors (Coulombe, Chata, Akoly, and Amouzouvi, 2012). 61.8% and 71.4% of individuals suffering respectively from malaria and dental problems opted for self-medication (DGSCN, 2011). It is the same for diarrhea and respiratory problems where the individuals having chosen for self-medication are respectively estimated at 57.5% and 64.6%. According to the same result, only 42.2% of the households reported to have access to health facilities (DGSCN, 2011). The consultations have considerably decreased. So, it is noted that, the number of visits to hospitals has fallen drastically since 1990: it fell from 60% in 1990 to 31% in 2010 (Ministry of Health, 2011). According to the Ministry of Health (2009), the coverage rate in postnatal consultation remains low on the whole country and varies from 9. 5% to 39.4 %. Along the same line, less than half (47.1%) of child deliveries are observed in health centers. Since five years, there has been a significant annual increase of over 10% hospitalized patients (Ministry of Health, 2012).

Individually, the first referral hospital in Togo (SO UTH) has experienced a significant increase in 2010 (48.03%) in mortality at the department of intensive care. In 2009, the Traumatology has recorded the highest Average Length-Of-Stay (ALOS); a patient has spent, on average one month in the hospital. The Obstetrics Gynecology service has realized 2 855 operations in 2010 against 3 496 in 2009: that being explained by the slowdown in the block activities.

These indicators led us to ask two questions

- Is there any possibility to do better despite the scarcity of resources?
- Is there any waste of resources allocated to public hospitals despite their shortages?

Providing more public services with less public expenses is an ongoing challenge for Togo where the scarcity of resources is becoming increasingly important. The aim of this study is to evaluate the efficiency of the public hospitals in Togo. The study will examine if it is possible to obtain maximal output from a given set or to reduce proportionally input without a reduction in output. This study would allow on the one hand, to identify the factors that may better explain the inefficient management of the inputs in public health sector. On the other hand, it would allow to identify the efforts to be made by each technical department (admission, hospitalization, surgery, maternity etc.) in order to improve their performance. Of interest, the empirical exploration may yield some interesting insights that could be useful to the regulators, Togolese policy makers, and also to the managements of public institutions. This study could also provide useful policy information.

From a methodological point of view, we introduce a directional distance function which considers simultaneous improvements on the input and output side by basically combining the Farrell input and output efficiency measures into one measure. The directional distance function makes it possible to evaluate the scale of the economies that can be achieved and the possible improvements in production; it also provides a benchmark, by defining a reference point to be reached (Barros and al. 2008). Therefore we define a production frontier which establishes best practices observed among hospitals.

The present paper is organized as follows. Section 2 outlines the theory and method behind the measurement of efficiency using directional distance functions. The dataset used in our empirical illustration is also described in the second section. In section 3, we discuss the results. Finally, section 4 deals with the conclusion.

2. Materials and Methods

2.1 Efficiency measurement methods

Three works come readily to one's mind when discussing the measurement of technical efficiency (Koopmans, 1951; Debreu, 1951; Farrell, 1957). Debreu (1951) provided a measure of technical efficiency qualified as radial measure. He introduced an index of technical efficiency better known as the coefficient of resource utilization. Farrell (1957) extended the idea of Debreu. He defines technical efficiency as follows: technical efficiency reflects the ability of a firm to obtain maximal output from a given set of input or the technical efficiency of a firm could be the amount by which all inputs could be proportionally reduced without a reduction in output. The first study on the measurement of technical efficiency in the health sector was made in 1982. Wilson and Jadlow (1982) were the first to be interested in technical efficiency in the health sector. It was followed by a rapid growth of research in this area in the early 1990s. Hollingsworth and al. (2008) provided a literature review on studies conducted on the technical efficiency in health sector. It shows an increasing emphasis on the evaluation of the productive performance in the field of health. The interest on hospital efficiency has increased because of the desire to control the increasing costs. Accordingly, hospital resources and their processes became critical and, as a result, the number of studies has increased in recent years (Bakar, Hakim, Chong, and Lin, 2009). Studies on hospital efficiency mostly focus on the issue of maximum gain with limited resources (Sarkis and Talluri, 2002). Compared with other industries, measuring efficiency in the health sector is complicated by characteristics specific to health and health services (Ozcan, 2008). Measuring efficiency requires a conceptual framework with which to specify the productive process and derive efficiency measures in terms of well-defined variables. Health care managers must adapt new methods to use the resources at their disposal in order to achieve high performance, namely effective and high quality medical outcomes (Ozcan, 2008). The applications to hospitals and other health care organizations and areas are reviewed and summarized in Hollingsworth and al. (2008).

Methodologically, there are two contemporary approaches to measure hospital efficiency: the parametric approach and the non-parametric approach. The Firsts and foremost parametric and non-parametric methods commonly used are respectively the Stochastic Frontier Analysis (SFA) and the Data Envelopment Analysis (DEA). DEA method appears to be the most suitable to measure the technical efficiency of public health facilities multi-output. It allows the measurement of efficiency in the presence of multiple inputs and outputs without requiring the specification of a functional form. Indeed, the DEA method requires no special assumptions because the frontier is determined by the data. In the health sector, it sometimes lacks depth technical knowledge on productive processes. The use of SFA method can be risky in this context. SFA method allows the existence of randomness in the analysis since it includes an error term that can be divided into two components: inefficiency and a statistical residual (Moreira, 2008). One of the main drawbacks of this approach is the requirement of a priori specification of the production frontier's functional form and the distribution of the error term, which constrain the analysis of efficiency (Moreira, 2008). DEA has the advantage that we do not need to specify a functional form for the production frontier, while in SFA we must select a functional form. Thus, DEA has been the more popular method, probably because DEA methods are easy to draw on diagrams, easy to calculate, while until recently SFA could not accommodate multiple outputs (Coelli and al. 2003). The comprehensive review by Hollingsworth in 2008 revealed that two-thirds of completed studies have used DEA method and more than half of them focused on hospitals. It should be noted that Sherman (1984) was the first to use DEA to evaluate overall hospital efficiency. The DEA method determines the efficiency benchmarks (reference production unit). But it requires that the relationship between the inputs and outputs are held constant when the radial distance of Shephard (1971) is used.

In the Farrell (and Shephard) approach to efficiency measurement with the DEA method, all inputs are reduced or all outputs are expanded by the same factor. As a consequence, useful information is lost. This proportional adjustment has been challenged by a series of alternative efficiency measurements approaches (Bogetoft and Otto, 2010). A more profound alternative or generalization of Farrell's proportional approach is based on directional distance functions.

The first non-radial measures emerged in the late 1970s and derives from Färe and Lovell (1978), Färe, Grosskopf and al. (1985). In the 1990s, Luenberger (1992, 1996) proposed the new consumer and producer theories. Chambers, Chung, and Färe (1996, 1998) extended this work in production theory and introduced a measure of technical efficiency better known as directional distance function. This reduces the inefficiencies observed by looking simultaneously to the contraction of inputs and expansion of output.

2.1.1 Directional distance function approach

The recent literature on DEA methods has shown that it is possible to consider simultaneous improvements on the input and output side by combining basically the Farrell input and output efficiency measures into one measure. Thus, the directional distance function determines a shortcut in one direction which permits an observed production unit to reach the production frontier (Barros and al. 2007). The main advantage of the directional distance function lies in its ability to take account, simultaneously, of both inputs and outputs.

Assume that each hospital uses a vector of resources $x_t = (x_1,...,x_n) \in R_+^N$ to produce a vector of activities: $y_t = (y_1,...,y_n) \in R_+^M$ at the time period t. The set of all technologically possible input-output combinations is given by the following production technology:

$$T = \{(x, y) \in R_+^{M+N} | (x, y) \ \ is \ \ feasable\}. \qquad (1)$$

T satisfies the following conventional assumptions (Barros and al. 2007):

(i) $(0,0) \in T, (0, y_t) \in T_t \Rightarrow y_t = 0$, i.e., no free lunch;

(ii) The set $A(x_t) = \{(u_t, y_t) \in T_t ; u_t \leq x_t\}$ of dominating observations is bounded $\forall x_t \in R_+^N$, i.e., infinite outputs are not allowed with a finite input vector;

(iii) T_t is closed;

(iv) $\forall (x_t, y_t) \in T_t, (x_t, -y_t) \leq (u_t, -v_t) \Rightarrow (u_t, v_t) \in T_t$, i.e., fewer outputs can always be produced with more inputs, and vice versa (strong disposal of inputs and outputs);

(v) T_t is convex

The directional distance function generalizes the traditional Shephard distance function (Shephard, 1970). The directional distance function projects an input and/or output vector from itself to the technology frontier, in a pre-assigned direction. In the case of a radial direction, out of the origin, we retrieve the classical Shephard distance function (Barros and al. 2007). We use the following directional distance function definition:

The function $D_T : R^{N+M} \times R^{N+M} \rightarrow R \cup \{-\infty\} \cup \{+\infty\}$ defined by:

$$D_t(x_t, y_t; g) = \begin{cases} \sup\{\delta : (x_t - \delta h; y_t + \delta k) \in T_t \ \ if \\ (x_t - \delta h; y_t + \delta k) \in T_t, \delta \in R) \\ -\infty \quad otherwise \end{cases} \tag{2}$$

Where $g = (h,k)$ is a vector indicating the direction in which an observation is projected towards the production frontier. h and k are the vectors representing directions. The value of the function indicates the maximum number of times the vector $(-h,k)$ can be added to obtain a shift of the vector of production to the production frontier. In our study, each direction was set to 1, that is to say that hospitals were not considered as cost centers but as units that seek to maximize the amount of output and minimize the input quantities.

The directional distance function is an equivalent representation of the technology, in particular $(x_t, y_t) \in T_t \Leftrightarrow D_t(x, y, h, k) \geq 0$

Values equal zero indicate that the production plan is efficient since there is no possible movement towards the frontier (i.e., an observation lies on the frontier and is "efficient"). However, a positive value indicates that an observation lies below the frontier (i.e., it is inefficient). It is possible to modify the production plan to move to the frontier and achieve technical efficiency.

We use a non-parametric approach, to estimate the proportional distance function (Banker and Maindiratta, 1988; Varian 1984). The technology (Barros and al., 2007) can be written as:

$$T_t = \left\{ (x_t, y_t) : x_t \geq \sum_j \theta_j x_t^j, y_t \leq \sum_j \theta_j y_t^j, \theta_j \geq 0, j = 1,..., J \right\} \tag{3}$$

Where j denotes the number of hospitals in the sample.

From an operational perspective, this distance function is calculated using the linear programing. The linear program (Barros and al. 2007) that calculates the values of the directional distance function is given by:

$$\begin{cases} D_t(x_t, y_t) = \max \delta_t \\ s.t.,x_t - \delta_t x_t \geq \sum_j \theta_j x_t^j, \\ y_t + \delta_t y_t \leq \sum_j \theta_j y_t^j \\ \theta_j \geq 0, j = 1,..., J \end{cases} \tag{4}$$

In the two first constraints, the θ are the variables weights to be determined by the solution of this problem.

It is possible to get an input oriented version and an output oriented version of the directional distance function by linking directions respectively $g = (h,0)$ and $g = (0,k)$.

2.1.2 *Data*

Data for this study were compiled in 2011. With the support of the Ministry of Health, we had in our possession, the 2010 annual reports of health activities for all the Togolese hospital. However, to check the validity of the data available in reports, we visited all these hospitals with teams. For this purpose, we got a formal authorization signed by the Minister of Health for access to hospitals. Interviews were conducted with staff leaders, hospital officials, doctors and administrative staff. Only 139 hospitals had data almost identical to those collected in the field reports. This justifies the fact that our study focuses on 139 hospitals.

Measuring hospital inputs

Labor input can be classified into several categories. Some authors consider only two categories: doctors and other staff (Eakin, 1991) or nursing and non-nursing (Folland and Hofler, 2001). Others consider three categories: academic staff, nursing staff and administrative staff (Steinmann and Zweifel, 2003). Another group considers four categories: medical staff, nurses, other health workers and administrative staff (Scuffham, Devlin and al. 1996). As indicators of labor input we retain: Medical Staff, Paramedical Staff, Technical Staff, and Administrative Staff.

Capital factor: Ozcan and Luke (1993) showed that one can estimate capital investments in a hospital using two indicators: (i) plant size, measured by number of operational beds, and (ii) plant complexity, measured using number of diagnostic and special services provided exclusively by the hospital. In the absence of specific data on the technical wherewithal, it will be estimated from the number of beds available at the health facilities (Dervaux, Leleu and al. 1997; Grosskopf, Margaritis and al. 2001; Hollingsworth, 2003).

Measuring hospital outputs

The ultimate output of hospital operation is the improvement of the patient’s health (Farsi and Filippini, 2004). But the improvement of the patient’s health is difficult to measure. It is therefore necessary to consider observable intermediary products as hospital outputs (Filippini and Farsi, 2004). Steinmann and Zweifel (2003) consider two levels of production for hospitals: the number of patient-days and number of patients. Vita (1990) considers the number of cases and the average length-of-stay as two dimensions of output. Scuffham and al. (1996) on the other hand, consider three aggregate outputs: total number of admissions, average length of hospitalization, and the number of outpatient visits. Carey (1997) considers two outputs: discharges and outpatient visits.
As indicators of outputs we retain: Admissions representing all individuals requesting a consultation at the hospital during the year (Afonso and Fernandes, 2008); Hospitalizations (Dervaux, Leleu and al. 1997; Linna, 1998) and the number of surgical act (Dervaux, Leleu, and al. 1997; Audibert, Dukhan and al. 2008).

To these we can add the total number of child deliveries and the number of women received for Antenatal Care (ANC). These latter two indicators refer to the United Nations’ MDGs 4 and 5.

For the purpose of this study, two combinations of inputs and outputs were used.

Table 1: Types of patterns analyzed

	Inputs	Outputs
Model 1	Medical Staff (pmed), Paramedical Staff (ppara), Technical Staff (ptech), Administrative Staff (padm), Number of beds (nlit)	Admissions, Hospitalizations, Number of surgical activities
Model 2	Medical Staff, Paramedical Staff, Technical Staff, Administrative Staff, Number of beds	Admissions, Child Deliveries, ANC

Source: author

The second model (Table 1) refers to an environment in which there are only small hospitals (MSC and PCU). MSC and PCU are considered to be operating in the same environment. The first model is concerned, by cons, by large hospitals (UTH, RH and DH).

The health system in Togo is pyramidal with three levels: central, intermediate, and peripheral. The base of the pyramid represents the peripheral level or the operational level. The middle of the pyramid representing the intermediate or regional level and corresponds to 6 health regions. Finally, the top of the pyramid consists of the Office of the Department and its central offices.

The Peripherals Care Units (PCU) are the first level of care and usually the only link that is maintained by rural people with a health care recognized by the State. They are designed for a population between 5 000 and 15 000 inhabitants. There usually consist of five beds, four of which are for motherhood.

The Medical Social Centers (MSC) are designed for a population of over 15 000 with an average of 16 beds in the interest of curative and maternity cares. Officially, the staff consists of a physician, a nurse, an auxiliary reverse, a midwife, a laboratory technician, one auxiliary midwife, and a maneuver.
District hospitals (DH) that cannot support serious cases that may jeopardize life are directly evacuated to the University Teaching Hospitals (UTH) or Regional Hospitals (RH).
In each referral hospital (UTH, RH), the technical service is composed of six departments: internal medicine and medical specialties, Surgery and surgical specialties, Pediatrics and Pediatric Specialty, Department of Gynecology and Obstetrics , Department of Pulmonary and Infectious Diseases, services for the diagnosis, laboratories , the Radiology department, Pharmacy, and Biomedical maintenance service.

In this study, we opted for variable returns to scale (VRS) for several reasons: (i) it is a general approach that is usually more suitable when it comes to taking into account the multi-output nature; (ii) this approach enables one to control in part the bias related to the history of the hospital being studied (past investment, staff training, etc.); and (iii) it enables a distinction between pure technical efficiency and scale efficiency.

3. *Results and Discussion*

We have used R software and Benchmarking packages (Bogetoft and Otto, 2010).

Table 2, below shows that, on average, large hospitals are technically inefficient. It is possible, for all the inefficient hospitals in 2010, to increase their outputs by 5290.121 units while maintaining inputs level or reducing their inputs used by 14.653 units while maintaining the level of output. For example, it is possible, for Regional Hospital of Sokodé to increase their outputs by 5093.765 units while maintaining the level of inputs. Once this effort made, the hospital will be considered "efficient”.

Table 2: Distribution of care units according to the efficiency score (model 1)

	Input-Output Orientation	Input Orientation	Output Orientation
Number of efficient hospitals	11	11	11
Number of inefficient hospitals	17	17	17
Average Score	19.651	19.712	2974.34
Max Score	110.554	111.103	5290.12

Source: author

A good indicator of the efficiency of a hospital is the use of the facilities by hospital patients. The results show that, on average, only 41.45% of the beds were actually occupied in these hospitals (Table 3). The number of functional beds could be reduced by about 58.55% while maintaining outputs level. This result is in line with those made by the World Health Organization over eighteen countries with low and average incomes. Indeed, Chisholm and Evans (2010) have shown that in these eighteen countries, only 55% of beds were occupied in district hospitals far below the recommended 80 to 90%. Similarly, it is estimated that at least 50% of the medical equipment of health facilities in developing countries is partly usable or completely unusable (Issakov, 1994).

Table 3: Inputs Contraction and Outputs expansions

Inputs Contraction					Outputs Contraction		
Pmed	ppara	ptech	padm	nlit	admission	hospital	Surgery
14%	51.67%	21%	36.53%	58.55%	400%	94.24%	90.70%

Source: author

Internal factors that influence the efficiency of hospitals are generally represented by elements of governance such as the management of human and technical resources. With regard to this management of human and technical resources, the loss of efficiency in hospitals due to poor management of labor is important in Togo.

The results in Table 3 show that on average, only 48.83% of the paramedical staff and 63.47% of the administrative staff were actually employed in these hospitals. It is the same with medical staff and technical staff. It was possible in 2010 with unchanged output level to reduce respectively the medical and technical staff by 14% and 21%. The inefficiency of labor factor is explained by unexplained absences, and too much time spent at rest. These unexplained absences and time spent at rest could be explained by the diversity of hiring contracts in force in the sector. Furthermore, the removal of the evaluation of agents funded from the autonomous budget and the lack of department heads in many health centers contribute to the increase of the technical inefficiency of public hospitals. Indeed, the personnel earning their salaries on the autonomous budget are the highest expenditure of the hospital share, representing approximately 61.73% of the medical staff. Such staffs are often hired on a mere request. An important part of this category of staff is often recommended or imposed by a higher-level chain of command in the hospital commonly known as an influential network. As a result, it becomes difficult for the manager or the person in charge of the hospital to compel the employee or physician hired on such a type of contract to provide maximal effort. In doing so, the employee is induced or encouraged by this system of corruption and pressure from the hierarchy to spend less time in the delivery of public health care. Thus, health workers spend more time in the private sector. Consequently, these unexplained absences, these too much time to rest, and these less time spent in public hospitals reduce considerably the efficiency level. These findings corroborate with the work done by Kurowski and al. (2007). In Tanzania, for example, it was reported that unexplained absences and time to rest, socialize and expect patients reduce the efficiency levels by 26% (Kurowski, Wyss and al., 2007).

As a result, the poor governance characterized by low bed occupancy rates and inefficient management of labor is reflected in the provision of health care. Indeed, it was possible in 2010 that surgical and Pediatrics services increase their outputs respectively by 90.70% and 94.24%. The admissions department is the most inefficient. This service could multiply these activities by 4 in 2010.

The lack of qualified personnel and technical equipment, the dilapidated health infrastructures and the low financial affordability should not be the only factors explaining the level of production and the current health of the Togolese population. The governance factors such as the effective management of human and technical resources should be prominent in the health development policies.

Regarding the estimation of the second model (111 hospitals) on environment 2, we are present the summarize results in Table 4.

Table 4: Distribution of care units according to the efficiency score (Model 2)

	Input-Output Orientation	Input Orientation	Output Orientation
Number of efficient hospitals	70 (63.06%)	70 (63.06%)	**13 (11.71%)**
Number of inefficient hospitals	41 (36.93%)	41 (36.93%)	91 (81.98%)
Average Score	**1.213**	**1.215**	**268.448637**
Max	15	15	675.61
Min	0	0	0

Source: author

The majority of health facilities in environment 2 are located on the efficiency frontier (Table 4), that is to say, they are technically efficient. Approximately 63.06% of health facilities are efficient in the context of the full directional distance function and the input-oriented case. The effort to be made by inefficient hospitals to be on the frontier is low. On average, to become efficient, these units must only increase their amounts of output by 1.21 units and simultaneously reduce their input levels by the same number of units.

Conversely, considering the output orientation, the effort of these hospitals to become efficient is high. Indeed, on average, these hospitals to become efficient in 2010, they had to increase their production by 268.44 units. These results suggest that in the context of small hospitals it is not possible to try to minimize the quantities of inputs used. They should focus instead on maximizing production. In addition to lack of resources, the allocation of resources is usually done at the expense of smaller hospitals located in rural areas.

4. Conclusion

This study is devoted to the analysis of the efficiency of public hospitals in Togo. This was to check if it is possible, in the Togolese health system for each hospital, with constant factor endowment, to increase its output level or, with unchanged production, reduce its use of input or both increase its activity while reducing its resources. To achieve this objective, we used the directional distance functions approach. This study showed that, on average, public hospitals were technically inefficient. However, the effort of the smaller hospitals to be on the efficiency frontier is low. It should be noted that Togolese health facilities are not homogeneous and do not have the same productive capacity. Thus, these results should be cautiously analyzed.

The University Teaching Hospital (UTH) and Regional Hospitals (RH) are respectively the first and second referral facilities. These referral hospitals treat severe cases. These hospitals were faced to late admission of patients, late transfer of patients who are already in a hopeless state, lack of financial availability for the purchase of pharmaceutical products and the lack of qualified personnel. The mortality rate was high in these hospitals and the main cause is the delay in the evacuation of patients from the peripherals facilities to the UTH. It was also noted, in some referral hospitals the lack of specialized services such as cardiology, neurology and pediatric surgery and so on. In these referral hospitals, it is also noticed a derisory hospitalization condition of patients. The absence of a functional system of reference, the inadequate quality of care and the lack of care prepayment system (mutual) could explain this high level of inefficiency of large hospitals. Besides, internal factors that influence the efficiency of hospitals are represented by elements of governance such as the management of human and technical resources.

The heads of peripherals care units, private hospitals, and traditional healers should be sensitized on the negative consequences of late transfers. Given the high proportion of staff financed on the autonomous budget (about 61.73%), we propose the resumption of the assessment of staff recruited on autonomous budget and appointment of department heads in different hospitals. For future public health policies, small hospitals should be encouraged to increase their quantity of output through an increase in physical, financial, and especially human resources allocated to them.

Finally, health policies could have a positive and significant impact on the technical efficiency of public hospitals in Togo if these policies take place in an enhanced governance context.

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