ANALYSIS OF THE PERFORMANCES OF THE HEALTH SYSTEM IN BURKINA FASO

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Abstract— Our main concern in proposing these applications is to provide a tool, with is the Data Envelopment Analysis (DEA) approach, for contributing to monitoring and evaluating programs, projects or development activities of the national health system. DEA approach was applied using the Charnes, Cooper and Rhodes (CCR) model, to calculate the indices measuring the performance efficiencies and Malmquist indices for measuring changes in productivity of health regions and districts in Burkina Faso. The results obtained show that the health system of Burkina Faso through the regions or districts had a low progress but that the system on variables used may well occur with the inputs allocated. This can also be seen through the huge disparities in performance efficiency scores of different regions and districts of the health system. While conventional methods are already used for the case of Burkina Faso to analyze the performances, it will be a first time that DEA approach was used to analyze the performance of the health system.

Index Terms— *Burkina Faso, Data Envelopment Analysis, efficiency, health performance indicator, undesirable output*

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1 INTRODUCTION

Since the 90s, there are more and more applications using techniques DEA to measure the efficiencies in terms of performances, activities of the units of health systems. These various applications were interested in the hospitable systems, in private hospitals, in districts and sanitary regions.

In this paper, we use the models of DEA, on one hand, to measure the efficiencies of performance of regions and sanitary districts in Burkina Faso for two years; on the other hand, we calculate the indices which measure the variations of performances (technical efficiencies, technology of production, productivity) of these two years. The structure of this paper is the following one: the section 2 presents the objectives and the motivations of these applications; the section 3 presents the methodology and the performance indicators (priority) of the national system of the health; the section 4 presents a first case study of measure of the efficiencies of performance and changes of performance of the sanitary regions; the section 5 presents the second case study of measure of efficiencies of performance and changes of performance of the sanitary districts; finally in the last section we shall give the conclusions relative to analyses and the perspectives of applications in the Healthcare sector.

2 OBJECTIVES

As well as the sector of the education, in particular the basic teaching, the health system is considered priority in the "Poverty Reduction Strategy Paper" (PRSP) in Burkina Faso for 2000 to 2010.

To accelerate the development of this sector, several programs are set up by the Government, to facilitate the access of the most deprived to the basic care (curative or preventive). This is the way the «National Plan of Sanitary Development» is set up.

Our main concern by proposing these applications is to supply a tool contributing to the follow-up and to the evaluation of the programs, the projects or the activities of development of the national system of health.

The efficiencies of performance of regions and/or sanitary districts are encouraged by the Government, by determining for example every year the best managements (regions or districts). These encouragements show the will of research for optimal productivity for the national system of health. It is a question for us here of showing that the DEA method can be complementary in the existing methods (classic statistical models). Indeed, in the case of the system of the health, this method can facilitate the decision-makers by integrating multiple factors inputs and multiple factors outputs, without incorporating values of judgment (weight or importance).

The specific objectives of the applications are:

- To allow the measures and the analyses of the efficiencies of production (care in health);

- To allow the determination of the efficient managements which can serve as reference;

- To allow the determination of the sources of production inefficiencie;

- To allow the follow-up and the measure of the variations of efficiency and productivity of two successive years;

- To allow the decision-makers and the national and international partners to direct the investments by taking

into account reference managements and sources of inefficiencies.

We were motivated, on one hand, by the will of the Government to make accessible to all the populations the primary care of health by the decentralization and the devolution of care centers, on the other hand, the objectives of development of the national system of health are clearly defined by indicators of follow-up and evaluation.

3 METHODOLOGY AND PERFORMANCE INDICATORS

In this study we use DEA method to measure the performances of the health system in Burkina Faso, on one hand and on the other hand, we shall present indicators of sanitary performance described in the national plan of sanitary development (2001-2010).

The advantage of using DEA for the analysis of the performances in the health system is that it makes it possible to build what is called a technology of production using only the data observed, without previously assigning weights to the various factors or decision-making units. "We understand by technology in this work, the program and the set of methods and techniques used to transform the input factors into output factors. In the DEA approach, the technology is characterized by the efficient frontier of production. Thus all the units on the efficient frontier of production have the best possible productivity. The others on the contrary are inefficient. In this case, inefficiencies are given by the differences observed between the efficient frontier of production and the data observed. In the same way, the sources of inefficiency are given by these differences observed.

The variables considered in this study are assumed not to be rigid. The inputs can be reduced or increased to improve the outputs. In other words, the various input and output factors used are assumed as controllable on the provincial level.

3.1 Model CCR and calculation of the productivity indices

The DEA method proposed by Charnes, Cooper and Rhodes in 1978, is a tool of diagnosis of the operations of production of decision-making units (DMUs) of a given system of production. It is an effective method a posteriori operation of production of these DMUs. This method allows estimating the technology of production of a system of production by a function of production, on the basis of the observations of the productions of the various one DMUs which make up it.

The efficiency of the use of the DEA approach lives in the consideration of all the important factors of production of a given system. So, before any application of DEA, it is important that the factors of production are defined well and justifiable (acceptable by the decision-maker).

The basic models of DEA can apply to problems of measure of performance of the DMUs with factors inputs and/or outputs often undesirable. We consider here the mixed situation with the presence of undesirable factors in particular the presence of the undesirable outputs.

To apply DEA with undesirable output, as it is case in this paper, we use the approach proposed by Seiford and Zhu (2002)(See also the paper of Vencheh A. H. et al. (2005)). In the literature we find several applications considering undesirable factors as the works of: Scheel H. (2001) ; Zofío J. L. and Prieto A. M. (2001) ; Chen Y. et al. (2003) ; Färe R. et al. (2004) ; Jahanshahloo G. R., et al. (2004) ; Korhonen P. J. and Luptacik M. (2004) ; Yu M. M. (2004).

To apply the DEA models in this paper, we consider the health system as a system of production with n DMUs. We shall note this system S (the DMUs which can be here the considered districts or the considered regional directions, according to the study).

A system with n DMUs is considered and these various DMUs are indexed by j, $j=1...n$. The vector of the input variables corresponding to unit j will be noted X_j. and that of the output variables Y_j. We note by d, the unit which is under evaluation by the DEA method.

In the formulation CCR, we consider all the possible productions of the system by
$$\mathcal{P} = \{(x, y): \sum_{i=1}^{n} \lambda_i X_i \leq x; \sum_{i=1}^{n} \lambda_i Y_i \geq y; \lambda_i \geq 0, j = 1, ..., n\}$$

The objective in this model CCR with output orientation is to minimize the ratio of the balanced value of the inputs and the balanced value of the outputs. What means looking for values given by factors for inputs which are the values maximum of production of factors possible outputs. The orientation output consists in determining the intensity of efficiency for a DMU d by the value Δ_d:

$$\Delta_d = \max\{\lambda: \lambda \geq 0; (X_d, \lambda Y_d) \in \mathcal{P}\} \qquad (1)$$

To measure the variations of performances of the DMUs from one year to the next, we used the approach proposed by Färe et al. (1992) (See also Färe R., Grosskopf S. (1994) ; Färe R. et al. (1996)) to determine the indices of Malmquist from the DEA approach. Indeed, in 1982, D.W. Caves, L.R. Christensen and W.E. Diewert propose a method, based on an idea of Malmquist (1953), for the measure of productivity by indices which characterize the consumption of the resources, for two any firms, taking into account only the observed data (inputs, outputs). If we consider:

- a and b represent two any firms;
- (x^a, y^a) and (x^b, y^b) the vectors of the inputs and the outputs, respectively these two firms;
- and the technologies, T_a and T_b of firms a; b are defined by the functions of production f_a and f_b.

To compare the inputs of firms *a* and *b* we define the index of measure of the inputs with regard to the firm *a*, by

$$\Delta^a(a,b) = \min_{\delta} \ \{\delta: \ f_a(y^a, \delta x^b) \geq \ f_a(y^a, x^a)\} \qquad (2)$$

$\Delta^a(a,b)$ represents the minimum proportion of factors inputs of the firm *b* required to be on the same border or curve of indifference as the firm has (for the quantities outputs data of the firm has according to T_a). So , $\Delta^a(a,b) > 1$ implies that with the technology of *a*, for the same quantity of outputs y^a, we use more inputs than *b* (see Griefell-Tatjé E. and Lovell C. A. K. (1995)).

Färe et al. (1994) suggest using these indications to measure the changes of performances in the time of a given firm. For two given periods t_0 and t_1 , the index of Malmquist, such as proposed by Färe and al ., measures the change of performances based on the changes inputs and observed outputs (see Färe R., Grosskopf S. (1994) ; Färe R. et al. (1996) ; Griefell-Tatjé E. and Lovell C. A. K. (1995) ; Maniadakis N. and Thanassoulis E., (2004)).

These authors above cited, suggest decomposing these indices of measure of performances into two components, the one measuring the change of technical efficiency and the other one measuring the change of technology of production. So, the variation of the total productivity is explained, at the same time by a change of production due to the technological progress, and by a variation of the technical efficiency. The technical efficiencies and the efficient borders of production for each of the periods can be determined by the DEA method (see Chen Y. and Ali A. I. (2004) ; Färe R. et al. (1996)). The index which indicates the change of efficiency is calculated with the hypothesis of constant return to scale.

3.2 Performance indicators of the national system of the health

To define the factors of production (inputs) and the resultant products (outputs) to be taken into account, it seems to us important to take into account only indicators of sanitary performance and the administrative and functional organization of the national system of health.

The administrative organization[1] of the health system includes 3 levels:
- The first level which is the central level (head offices) organized around the Ministry of health and around the General Secretary of the Ministry of Health;
- The intermediate level which includes the regional offices of the health;
- The peripheral level represented by the districts which are operational units the most decentralized by the national system of health.

The organization and the functioning of the structures of care (public) include three levels which assure the primary, secondary and tertiary care.

The first level is constituted by the sanitary district which includes two levels of care:

- The Center of care and Social advancement (CSPS) structures of basis of the sanitary system; -

- The Health center with Advanced surgical unit (CMA), which serves as reference for the sanitary trainings of the district

The second level is represented by the Regional hospital (CHR), which serves as reference and as help to the CMA.

The third level is established by the National Hospital center (CHN), which is the highest reference level for the specialized care; it is also of use as frame of training to the various categories of staff and as research.

The Government of Burkina Faso, through the National Plan of Sanitary Development (NPSD), had defined, for period 2001-2010, the big orientations for the development of the health, and its global objective was to reduce the morbidity and the mortality within the populations. To reach this global goal, eight intermediate objectives had been defined:

- Increase the national sanitary cover;

- Improve the quality and the use of health services;

- Strengthen the fight against the contagious diseases and the non-communicable diseases;

- Reduce the transmission of the HIV / AIDS;

- Develop the human resources in health;

- Increase the financing of the Healthcare sector;

- Strengthen the institutional capacities of the Ministry of Health.

The analysis of the resources in health shows that:

- The covering sanitary infrastructures is characterized by an insufficiency and a disparity in the distribution of the sanitary trainings according to regions and with regard to the defined standards;

- The available-person sales staff of in public health sector do not cover the needs for the country. Besides, there is a notorious disparity in the distribution of the staff enter on one hand, big cities (Ouagadougou and Bobo-Dioulasso) and on the other hand, the rest of the country;

- The general mortality is raised and is essentially due to the high rates of infant, infanto-young and maternal mortality.

[1] See in the paper of National plan of Sanitary Development 2001-2010, July, 2001, Burkina Faso

In these case studies, we define variables, inputs and outputs from these indicators of follow-up and evaluation of the performances of the sanitary system, defined in the NPSD, so as to take into account intermediate objectives for the development of this sector.

The defined variables allow taking into account:

- the strengthenings of the fight against the contagious diseases and the non-communicable diseases particularly the reduction of the global mortality, and the maternal mortality in particular, as well as the coverage rates in childbirthes assisted by the qualified personnel of health;

 - The program widened of vaccination (PEV) in particular:

- Against the tuberculosis with the "Bacillus of Calmette and Guerin (BCG)";

- Against the tetanus with him "Diphteria-Tetanus-Coqueluche-Polio (DTCP3)";

- Against the measles with the "Vaccine Anti-Rougeoleux (Var)";

- Against the yellow fever with the "Vaccine Anti-Amaril (VAA)";

- The improvement of the quality and the use of health services, in particular CSPS respecting the minimal standards.

The data result from statistical directories of the Ministry of Health which we often transformed for needs for application with the model which we use and especially all the data were normalized to work only with relative data. Any thing which does not modify at all the data initially obtained.

4 RESULTS AND INTERPRETATIONS

In this section, we shall present the results that we shall give some interpretations there relatives.

4.1 Efficiencies and changes of performance of the sanitary regions

4.1.1. Model, variables and data

To measure the performances at the regional level, 5 variables were defined by taking into account performance indicators of the national system of the health described in the previous section. It is a question of:

- X_1 input variable: this variable is calculated from the ratio (the number of CMA/the number of residents of the region). The data were normalized then by dividing by the biggest value of two years then to multiply by 100;

- X_2 input variable: it is the percentage of the CSPS respecting the minimal standards in staff. This variable measures the efficiency of the affectations of

the health workers in a CSPS according to the request i.e. the affectation of the health workers in a CSPS has to translate the real needs for this one;

- Y_1 desirable output variable: it corresponds to the coverage rate in childbirthes assisted by the qualified personnel of the health. It is a product of the system of the health supposed desirable as far as the objective is to have a total cover in childbirthes assisted by the qualified personnel of the health;

- Y_2 undesirable output variable: it is the mortality rate nursery school for 10.000. The values were transformed by translation (cf. remark below for the used transformations) then normalized. This variable is undesirable as far as the objective of the health system is to have no maternal mortality;

- Y_3 undesirable output variable: it is the number of deaths for 1000 in hospitalization.

The values were transformed by translation (cf. remark below for the used transformations) then normalized. This variable is unwanted as far as the objective of the health system is to have no death in hospitalization.

We did not consider here factors relative to the vaccinations of the population because the data are not available by region and it is the districts which check the operations of vaccination.

Remark: To use the approach of transformation of undesirable outputs variables proposed by Seiford and Zhu in 2002 before applying the CCR model, we proceeded in the following way. The undesirable output variable is *Y*, we make a change of variable by determining a vector *Z* > *0*, such as $\overline{Y} = Z - Y > 0$. To apply DEA, it is the values of the vector $\overline{Y}$ that are considered instead of those of *Y*. Indeed, because $\overline{Y} = Z - Y > 0$, by maximizing the values of $\overline{Y}$, we minimize the values of *Y* which are undesirable. We considered *Z* such as $z_r = 1 + \max_i \{y_{ri}\}$ with j representing regions for two years; for the normalization, we divided by the biggest value of two years for every factor to be normalized.

4.1.2. Results and analyses of the efficiencies of performance of the sanitary regions

To measure the technical efficiencies of the various units (regions or districts), the CCR model with output orientation is used by taking into account the presence of undesirable and not controllable factors. We calculated the scores of efficiencies of 13 regional offices, various indices of measure of changes and the indices of productivity of Malmquist. As previously, *E* represents the indice of measure of change of technical efficiency, *T* the indice of measure of change of technology of production, and *M* the indice of productivity of Malmquist of year 1 with regard to year 2.

1. Efficiencies of performance of the sanitary regions

After the application of the DEA method, we find at the level of regions:

- For the first year, only 3 regions ((Hauts-Bassins, Nord and Plateau- Central) are technically efficient. On average, the whole system by considering the data of regions could produce 34.09% (factors outputs) furthermore with regard to the performances of the various compared regions. This was translated by an average score obtained from the set which is 1.3409. The least successful regions with regard to the optimal performances are the region Sahel with a score of 1.9332, the region Sud-Ouest with a score of 1.7457 and the region Est with a score of 1.6039. This means respectively that these regions could produce (factors outputs) of 193.32%, 174.57% and 160.3% respectively furthermore. The region Centre should produce 14.30% more to be technically efficient;

- For the second year, only 2 regions are technically efficient, they are the regions Est (this region was not efficient first year) and of Plateau-Central. The average of the score of technical efficiency is 1.4096, what means that all the regions could some more produce of 40.96 % more to have all the regions on the efficient border of production. The regions which knew big differences compared with their potential optimal performances are the regions Sud-Ouest with a score of 2.2790 Centre with a score of 2.0681, Centre-Est with a score of 2.0150, Boucle Mouhoun with a score of 1.6314. These regions should produce 127.90%; 106.81%; 101.50% and 63.14% respectively of their current outputs to be on the efficient border. The region Hauts-Bassins has a score of 1.0334, what means that this region should produce of 3.34 % more to be efficient.

2. Variations of performance of the sanitary regions

After the application of the DEA method, we find at the level of regions the results on the changes in technical efficiency E:

- The region Plateau-Central did not know change in technical efficiency. Although this region remained techinal efficient on the two years, the method highlights that the region did not know positive change;

- 5 regions only knew a positive change in technical efficiency translating a progress into terms of efficiency. They are the regions Cascades with an indice E = 1.2470, Centre-Ouest with an indication E = 1.3377, centre-Sud with an indice E = 1.1260, the Est with an indice E = 1.6039, Sahel with an indice E = 1.3191;

- On average, the set of regions obtained an indice of measure of change in technical efficiency E = 1.0131. This shows that the system, through the sanitary regions remained almost stable with a trend to be increased in technical efficiency, with only 1.31 % of earnings of efficiency altogether;

- Among 7 regions which knew a loss in technical efficiency, the regions Centre and Hauts-Bassins obtained from indices E respectively of 0.5527 and 0.9677 translating a reduction in efficiency of performance.

After the application of the DEA method, we find at the level of regions the results on the changes of technology of production T:

- On average all the regions obtained an indice of change of technology T = 1.0060. This shows that the system, through the sanitary regions in the second year as like in the first year remained stable as for the applied technology of production. The technology of production in this case can be explained by the organization of regions and their functioning;

- 6 regions obtained a positive change of technology of production. They are regions, Boucle de Mouhoun with an indice T = 1.0760, Centre with an Indice T = 1.2736, Centre-Est with indice T = 1.2057, Centre-Nord with an indice T = 1.0653, Plateau-Central with an indice T = 1.2729, Sud-Ouest with an indice T = 1.3636. These positive change can be explained by relatively positive organizational and functional changes compared with all the sanitary regions;

After the application of the DEA method, we find at the level of regions the results on the changes of productivity M:

- On average, all the regions knew a loss of productivity with an average of Malmquist indices M = 0.9746. This result means that altogether, compared with the results (outputs) of the first year at the level of every region individually, the results (outputs) of the second year altogether declined;

- 8 regions knew a positive change of productivity with Malmquist index M> 1. The results of these 8 regions mean that these regions knew a development in productivity as a whole. Certain regions remained not efficient compared with the set but knew a positive change in efficiency of performance;

- Among 5 other regions, Centre and Hauts-Bassins knew a loss in productivity with indices of Malmquist of 0.7038 and 0.7290 respectively.

These various results show that at the level of regions, and with considered factors inputs and outputs, there are still efforts to make, and that there is enormous gap of inefficiencyes of performance from a region to the other one (region with a lage urban center and region largely rural).

4.2 Efficiencies and changes of performance of the health districts

4.2.1. Model, variables and data

To measure the performances at the health districts level, 6 variables were defined by taking into account performance indicators of the national system of the health described in the previous section. It is a question of:

- X_1 input variable: this variable is calculated from the ratio (the number of CSPS/the number of residents of the district). The data were normalized then by dividing by the biggest value of two year. Although regions control the CSPS in what concerns the management lastly level of allocations of resources,

the management of the CSPS is within the competence of districts;

- X_2 input variable: it is the percentage of the CSPS respecting the minimal standards in staff. This variable measures the efficiency of the affectations of the health workers in a CSPS according to the request i.e. the affectation of the health workers in a CSPS has to translate the real needs for this one;

- Y_1 desirable output variable: it corresponds to the coverage rate in childbirthes assisted by the qualified personnel of the health. It is a product of the system of the health supposed desirable as far as the objective is to have a total cover in childbirthes assisted by the qualified personnel of the health;

- Y_2 undesirable output variable: it is the mortality rate nursery school for 10.000. The values were transformed by translation (cf. remark below for the used transformations) then normalized. This variable is undesirable as far as the objective of the health system is to have no maternal mortality;

- Y_3 undesirable output variable: it is the number of deaths for 1000 in hospitalization;

- Y_4 desirable output variable: it is the arithmetic mean of the rates of vaccinal covers (BCG, DCTP3, VAA and VAR). This output factor is desirable as far as it is necessary to maximize it to answer the objectives of the programs widened by vaccination (PEV). The values were transformed by translation then normalized (cf. remark above in the previous case for the transformations by translation). We considered here factors relative to the vaccinations of the population because the data are available by districts and it is the districts which check the operations of vaccination.

4.2.2. Results and analyses of the efficiencies of performance of the health districts

As well as the results at the regional level, **E** represents the index of measure of change in technical efficiency, **T** the index of change of technology of production and **M** the index of productivity of Malmquist, of first year compared with second year.

1. Efficiencies of performance of the health districts

After the application of the DEA method, we find at the level of health disctricts:

- For the first year, it there only 7 on 52 districts are technically efficient that is 13.46 %. There are the districts ("Kossodo", "Paul VI", "Secteur 30") in the province of Kadiogo (region Centre), district of "Zabre" in the province of Boulgou (region Centre-Est), district of "Kongoussi" in the province of Bam (region Centre Nord), district of "sector 22 of Bobo" in the province of Houet (region Hauts-Bassins) and the district of "Yako" in

province of Passore (region Nord);

- The average score of technical efficiency is 1.3948, what means that on average, the set of districts should produce 39.48% of more outputs factors so that all the set of districts is technically efficient;

– 17 districts (32.69 % of the system) could produce at least more than 50 % to be efficient and among these districts, 5 should produce at least more than 75 % among which 3 at least more than double. These three last ones are "Po" of the province of Nahouri with a score of 2.0312, "Gorom-Gorom" of the province of Oudalan with a score of 2.2587 and the district of "Batie" of the province of Noumbiel with a score of 2.0107

For the second year, we find :

- it there only 8 on 55 districts are technically efficient that is 14.55 %. There are the districts ("Kossodo", "Paul VI", "Sector 30") in the province of Kadiogo (region Centre), district of "Tenkodogo" in the province of Boulgou (region Centre-Est), district of "Kongoussi" in the province of Bam (region Centre Nord), district of "Saponé" in the province of Bazega, district of "Zorgho" in the province of Ganzourgou and the district of "Djibo" in province of Soum;

- The average score of technical efficiency is 1.3406, what means that on average, the set of districts should produce 34.06% of more outputs factors so that all the set of districts is technically efficient;

- 11 districts (20 % of the system) could produce at least more than 50 % to be efficient and among these districts, 3 should produce at least more than 75 % .

These three last ones are the district of "Sindou" of the province of Leraba with a score of 2.0157, the district of "Gorom-Gorom" of the province of Oudalan with a score of 1.8732, and the district of "Batie" of the province of Noumbiel with a score of 1.7798. We notice these two quoted last ones, had in first year each a score far from the efficiency score (100%).

2. Variations of performance of the health districts

After the application of the DEA method, we find at the level of districts the results on the changes in technical efficiency **E**:

- 21 districts on 52 (that is 41.39%) knew a negative change in technical efficiency ;

- 3 districts didn't know change in technical efficiency ;

- 28 districts knew a positive change in technical efficiency ;

- On average, the set of health districts obtained an index of measure of change in technical efficiency E = 1.0512. This shows that the system, through the health districts remained almost stable with a trend to

be increased in technical efficiency, with only 5.12 % of earnings of efficiency altogether.

After the application of the DEA method, we find at the level of regions the results on the changes of technology of production T:

- On average all the regions obtained an indice of change of technology T = 1.1097. This shows that the system, through the districts in the second year as like in the first year remained stable as for the applied technology of production. The technology of production in this case can be explained by the organization of regions and their functioning;

- 6 districts obtained a negative change and 41 others obtained a positive change of technology of production. They are regions, Boucle de Mouhoun with an indice T = 1.0760, Centre with an Indice T = 1.2736, Centre-Est with indice T = 1.2057, Centre-Nord with an indice T = 1.0653, Plateau-Central with an indice T = 1.2729, Sud-Ouest with an indice T = 1.3636. These positive change can be explained by relatively positive organizational and functional changes compared with all the districts.

5 Conclusion

This study using the DEA approach, applied to the national system of health of Burkina Faso, highlights of splits at the level of the use of factors inputs.

These factors inputs in our models concern the CMA, the CSPS and the staff of the CSPS. The results show that on average the national system of the health owes and can produce more. Both at the regional level and at the peripheral level of districts, the national system of the health had to produce factors outputs during these two years of more than 34 %.

These factors outputs concern the maternal mortality, the cover in childbirthes assisted by the qualified personnel of the health, the deaths in hospitalization, the cover in vaccination against the tuberculosis, against the tetanus, against the yellow fever and against the measles (respectively BCG, DCTP3, VAA and VAR). These results can allow placing the responsibilities on the low results for a regional office or for a district with regard to the objectives beforehand established by head offices.

It seems to us important to underline after this application, the weak number of stable directions in their functioning; however at the regional level at the level of districts, we notice that, although there are some positive variations of performances, more results should be reached, certain directions that must increase even their performances of more than 100 %.

In perspective, it would be interesting to include data on the

difficulties of access to care centers, the offered services, the motivations (social, financial, religious, etc.) women on the typesof adopted childbirthes. It would be also interesting, we think of it, to associate the measures of performances to select the best centers or the directions, or still, to redistribute funds or additional resources. For example, keep stable the factors of production the best units, take into account the reference units to adjust the factors of production the least effective.

The information supplied by the technical efficiencies and the indications of productivity can be used to light the persons in charge of unity or administrators on best practices and sources of ineffectiveness of the ineffective units.

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