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72838

A TALE OF EXCESSIVE HOSPITAL AUTONOMY

An Evaluation of the Hospital Reform in Senegal

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AFTHE / World Bank / June 2012

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Health, Nutrition, and Population (HNP) Discussion Paper

A Tale of Excessive Hospital Autonomy:

An Evaluation of the Hospital Reform in Senegal

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Paper funded by the World Bank and the Global Alliance for Vaccines and Immunization (GAVI)

Abstract: In 1998, Senegal launched an ambitious hospital reform. More than ten years later, despite a massive injection of government funds in hospitals, many of them are now close to bankruptcy. However, this reform clearly had the effect of "bringing back patients" to hospitals. While hospitals were largely empty (as in many Sub-Saharan African countries), the number of hospital-based outpatient visits has increased by over 20 percent every year since 2000. This increased activity also suggests that hospitals have become more attractive for patients and that the quality of care may have improved. In contrast, equity of access to hospital care (especially for the poorest) has clearly deteriorated. While the proportion of poor is estimated at nearly 51 percent of the Senegalese population, this group constitutes only 3 percent of hospital patients. Last but not least, the hospital reform has resulted in a major deterioration in the technical efficiency of the hospital system. The first reason is the uncontrolled increase of the wage bill, both because of massive recruitment of unqualified staff and because of the creation of numerous and inconsistent staff bonuses. A second reason is the underfunding of several free care programs, especially of the *Plan Sesame* (that is, free care for the elderly).

The mixed results of this hospital reform are due to several factors. The 1998 reform is a textbook case of granting very large management autonomy to hospitals without implementing any serious accountability mechanism. Hospitals have indeed acquired considerable autonomy in all management areas. It might have been possible to avoid the current situation if, in addition to empowering hospitals, some accountability mechanisms had been implemented; however, this did not happen.

Among the various remedies proposed, the utmost priority is to restore some government control over hospitals. This can be done by establishing mechanisms for evaluating hospital managers and controlling ex ante their budgets, especially their decisions about recruitments and compensation. A second priority would be to restore the efficiency of hospitals, which would require (i) revision of rates for hospital user fees so that they better reflect actual costs, (ii) reduction of overstaffing with nonqualified workers, and (iii) restructuring of the hospital system in Dakar.

Keywords: Hospital reform, governance, Data Envelopment Analysis

Disclaimer: The findings, interpretations, and conclusions expressed in the paper are entirely those of the authors, and do not represent the views of the World Bank, its Executive Directors, or the countries they represent.

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ABBREVIATIONS

	In French	In English
ALOS		Average Length of Stay
AM		Accountability Mechanism
ANH	Agence Nationale des Hôpitaux	National Agency Hospital
APS	Association de Promotion de la Santé	Health Promotion Association (hospital-based)
CIM	Classification Internationale des Maladies	International Classification of Diseases
CLIN	Comité de Lutte contre les Infections Nosocomiales	Committee for the fight against hospital-based infections
CME	Commission Médicale d'Etablissement	Hospital Medical Commission
CRS		Constant Return to Scale (DEA algorithm without scale effects)
CTE	Commission Technique d'Etablissement	Hospital Nonmedical Commission
DEA		Data Envelopment Analysis
DES	Direction des Etablissements de Santé	Hospital Directorate (at the MoH)
DRG		Diagnosis Related Group
DS		Decision Space
ESAM	Enquête Sénégalaise Auprès des Ménages	Senegalese Household Survey
ESPS	Enquête de Suivi de la Pauvreté au Sénégal	Survey for monitoring poverty in Senegal
FCFA	Francs de la Communauté Financière Africaine	
FDD	Fonds Décentralisés de Développement	Decentralized Development Funds
FNR	Fonds National des Retraites	National Pension Fund
HALD	Hôpital Albert Le Dantec	
HEAR	Hôpital d'Enfants Albert Royer	Albert Royer Children's Hospital
HOGGY	Hôpital of Grand Yoff	
IPRES	Institut de Prévoyance Retraite du Sénégal	Senegalese Pension Fund
MC		Management Capacities
MOH		Ministry of Health
NHA		National Health Accounts
OOP		Out-of-pocket
UNFPA		United Nations Population Fund
VRS		Variable Return to Scale (DEA algorithm with scale effects)
WB		World Bank
WHO		World Health Organization

EXECUTIVE SUMMARY

- In 1998, Senegal launched an ambitious hospital reform. More than ten years later, despite a massive injection of government funds into hospitals, many of them are now close to bankruptcy.
- However, this reform clearly had the effect of "bringing back patients" to hospitals. While hospitals were largely empty (as in many Sub-Saharan African countries), the number of hospital-based outpatient visits has increased by over 20 percent every year since 2000. This **positive evolution of hospital production** is explained by (i) a major effort of the government (recruitments of medical specialists, purchase of new equipment, and rehabilitation of buildings); and (ii) significant investments by hospitals. Hospitals indeed became autonomous (from 2000–01) in terms of their management. This autonomy included the ability to charge patients for hospital services (without any rate cap until 2005). The increased activity also suggests that hospitals have become more attractive for patients and that **the quality of care may have improved.**
- In contrast, **equity of access to hospital care (especially for the poorest) has clearly deteriorated.** While the proportion of poor is estimated at nearly 51 percent of the Senegalese population, this group constitutes only 3 percent of hospital patients.
- Last, but not least, the hospital reform has resulted in **a major deterioration in the technical efficiency** of the hospital system. The first reason is the uncontrolled increase of the wage bill, both because of massive recruitment of unqualified staff and because of the creation of numerous and inconsistent staff bonuses. A second reason is the underfunding of several free care programs, especially the Plan Sesame (that is, free care for the elderly).
- The very mixed results of this hospital reform are due to several factors. **The 1998 reform is a textbook case of granting very broad management autonomy to hospitals without implementing any serious accountability mechanism.** Hospitals have indeed acquired considerable autonomy in all management areas. It might have been possible to avoid the current situation if in addition to empowering hospitals, some accountability mechanisms had been implemented. This did not happen. The Hospital Directorate (DES), at the Ministry of Health, has long suffered from an unstable staff, an instability related to the higher staff bonuses offered by hospitals. Worse, the DES has not been granted any legal power to influence or control hospital management
- Among the various remedies proposed, the utmost priority is to **restore some government control over hospitals**. This can be done by (i) strengthening the DES and (ii) establishing mechanisms for evaluating hospital managers and controlling ex-ante their budgets, especially decisions related to recruitments and compensation. A second priority would be to **restore the efficiency of hospitals,** which would require (i) revising the rates for hospital user fees so that they better reflect actual costs, (ii) the reduction of overstaffing with nonqualified workers, and (iii) a restructuring of the hospital system in Dakar. Finally, **some progress on equity of access to hospital care** (for the benefit of the poor) could be achieved very quickly, in targeting a small portion of the operating subsidy to fund outpatient visits and hospitalizations of the poorest.

ACKNOWLEDGMENTS

At the request of Her Excellency, the Minister of Health and Medical Prevention, a first version of this study was prepared in April–May 2008 by the World Bank (Christophe Lemière and Vincent Turbat / AFTH2). The study was then updated in 2010, with help from Ms. Juliette Puret (Consultant, AFTHE).

Such a study would not have been possible without the continuous support of the Hospital Directorate at the Ministry of Health, including its Directors (Mr. Mame Abdoulaye Gueye and Mr. Balla Mbacké Mboup) and all their collaborators. Many hospital managers have also helped with this work.

This report has benefited from comments by McDonald Benjamin (Country Program Coordinator, AFCSN), Francoise Perrot (Senior Operations Officer, AFCSN), Heba Elgazzar (Economist / Health, MNSHH), Alain D'Hoore (Lead Economist, AFTP4), and Mamadou Ndione (Economist, AFTP4).

The authors are grateful to the World Bank for publishing this report as an HNP Discussion Paper.

1. CONTEXT AND OBJECTIVES OF THE 1998 HOSPITAL REFORM

Before the 1998 reform, Senegalese hospitals[1] had little legal and financial autonomy, a situation that could explain their poor performance. In the early 1990s, Senegalese hospitals were indeed facing the same problems as their counterparts in other Sub-Saharan African countries: they were rarely used by patients. In Senegal, hospital budgets had not increased since the 1960s. Therefore, numbers of medical and paramedical staff were very inadequate, a situation unlikely to attract patients. In addition, hospitals had no decision-making power and were still — legally speaking — divisions of the Ministry of Health. In such a bureaucratic context, it is not surprising that hospitals were poorly managed, which could explain the wastage and numerous stockouts of medicines and supplies. The only major innovation was the creation of hospital-based health committees (*Association pour la Promotion de la Santé* or APS). In theory, they were similar to the community-based committees created under the Bamako Initiative. With these APS, hospitals could achieve a timid financial and management autonomy. Unfortunately, most of these APS gradually passed under the control of hospital staff and were then found at the center of many abuses, especially in the area of recruitment. Given this situation, the Senegalese government started extensive consultations for preparing a radical hospital reform. The conclusions of these consultations are presented in the 1996 reports by Balique and Bettiga. It is on the basis of these reports that the hospital reform was launched in 1998.

The Senegalese hospital reform is heavily inspired by the French experience and has granted very large management autonomy to hospitals. The hospital reform was implemented through two bills: one in 1998–08 and the other in 1998–12, both dated March 2, 1998. These two bills are strongly inspired by the 1991 hospital bill in France. Some whole passages were even "copy-pasted." The objective is indeed similar: increasing the management autonomy of hospitals. The Senegalese reform thus provides hospitals with (i) a legal personality, (ii) the creation of a board of directors (chaired by the president of the regional council), (iii) rules for budgeting and financial management that are very close to the commercial sector ones, and especially (iv) the ability to charge patients for health care services.

While many new rights were granted to hospitals, their duties remained limited. For instance, one of the two bills (article 14 of bill 98–12) states that henceforth, hospitals "are exempt from any a priori control." Some accountability mechanisms were planned, but most of the time, they were not put in place. For instance, the strategic plans to be prepared by hospitals were supposed to comply with a national hospital master plan. But this national master plan was never produced (as of 2012). And anyway the process for ensuring compliance between the hospital plans and the national plans was never spelled out. Similarly, a financial controller (appointed by the Ministry of Finance) was assigned in each hospital, but his or her role was usually limited to checking formal compliance with basic accounting rules. Overall, the 1998 reform offers a rare example where a country grants its hospitals maximum management autonomy (or even quasi-privatization), with almost no accountability

1. In Senegal, the title "hospitals" is given only to referral hospitals. At a lower level, there are many other health facilities with inpatient and surgery capacity, but — rather strangely — they are still called "referral health centers" and not hospitals.

mechanism in place. It must be acknowledged that the Balique (1996) and Bettiga (1996) reports, which inspired the authorities at the time, insisted very little on accountability.

*Box **1**. The Hospital Sector in Senegal: Some Basic Facts*

In the public sector,[2] there are currently 22 hospitals, but only 20 are actually functional.

	Hospitals	Region	Number of beds	Comments
1	LE DANTEC (HALD)	Dakar	509	
2	HOGGY	Dakar	236	Formerly private
3	HOPITAL PRINCIPAL	Dakar	304	Military hospital
4	FANN	Dakar	313	
5	ABASS NDAO	Dakar	178	Owned and operated by the city of Dakar
6	HEAR (Albert Royer)	Dakar	118	The only children hospital in the country
7	PIKINE	Dakar	111	
8	THIAROYE	Dakar	96	Mental health hospital
9	OUROSSOGUI	Matam	117	
10	TOUBA		133	
11	DIOURBEL	Djourbel	124	
12	SAINT-LOUIS	St-Louis	234	
13	LOUGA	Louga	135	
14	TAMBACOUNDA	Tambacounda	105	
15	NDIOUM	St-Louis	104	
16	ZIGUINCHOR	Ziguinchor	142	
17	KAOLACK	Kaolack	306	
18	THIES	Thies	310	
19	KOLDA	Kolda	138	
20	HOPITAL de la PAIX	Ziguinchor	100	Not functional yet
21	HOPITAL FATICK	Fatick	110	Not functional yet
22	HOPITAL MILITAIRE DE OUAKAM (HMO)	Dakar	54	Military hospital

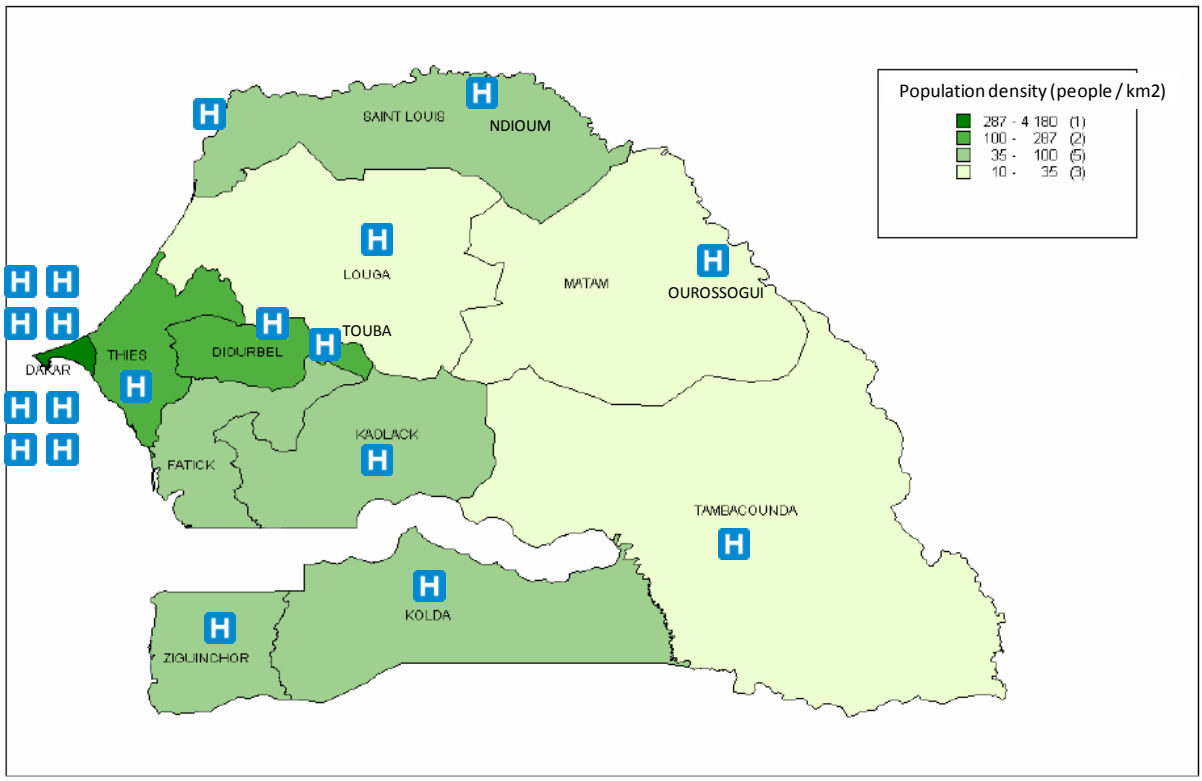
Source: Ministry of Health, 2009

Almost half of the existing hospitals are located in Dakar (where only 24 percent of the population lives). Some regions have no hospital (Matam, Kaffrine, Kédougou, and Sédhiou).

Several additional hospitals are under construction: Fatick and Ziguinchor (both for many years), Dalal Jamm in Guediawaye (a suburb of Dakar), and the children's hospital of Diamniadio (built by China).

2. This report is only about the public sector. It is worth noting anyway that — beside the usual for-profit hospitals in Dakar (for expatriates and rich Senegalese) — the not-for-profit (or faith-based) hospital sector is unusually weak, in comparison to other African countries. There are only four private not-for-profit hospitals, the biggest one being St-Jean de Dieu in Thies (100 beds). Their total bed capacity is only 6 percent of the public sector's capacity.

Hospitals Location and Population Density in Senegal



Source: National Census (RGPH3) (2002 data, published in 2006)

Source:Authors

2. THE VERY MIXED RESULTS OF THE HOSPITAL REFORM

More than ten years after this reform was implemented, how can its impact be assessed? This second section strives to provide some answers.

As for each component of a health system (that is, the hospital subsystem), we can distinguish four dimensions of performance: (i) effectiveness, (ii) quality, (iii) efficiency, and (iv) equity. These four dimensions can be defined more precisely:

- Effectiveness: Do hospitals produce health care services that meet demand (both in quantity and in type of health care services)?
- Quality: Are these services provided at a high level of clinical quality, with enough respect for patients?
- Efficiency: Are hospitals producing these services in an efficient way?
- Equity: Are services provided equally to all patients whatever their socioeconomic status?

For each of these four dimensions, a box provides a definition and describes the available measurement methods.

2.1. EFFECTIVENESS: HOSPITALS' RESPONSE TO HEALTH CARE DEMAND HAS IMPROVED BUT ONLY SLIGHTLY

*Box **2**. How to Measure Hospital Effectiveness?*

In principle, the effectiveness of a health system component corresponds to its impact on health outcomes.

Unfortunately, for hospitals, many studies have shown that it is illusory to try assessing this impact, even in developed countries (where hospital information systems are very sophisticated).

Accordingly, in low-income countries, estimating the effectiveness of hospitals is usually limited to measuring changes in utilization of hospital services. Practically, two indicators are analyzed: (i) the number of outpatient visits and (ii) the number of hospital stays or cases, both indicators being divided by the population. These two indicators can be seen as very rough indicators of the hospital response to health care demand.

In a more developed country, one could also analyze the hospital case-mix, that is to say the breakdown of hospital production by pathology. Of course, that can be done only if hospital production (outpatient and inpatients cases) is entirely coded, (that is, is assigned a code corresponding to the pathology diagnosed or treated). Such a clinical coding system does not exist yet in Senegal.

Source: Authors

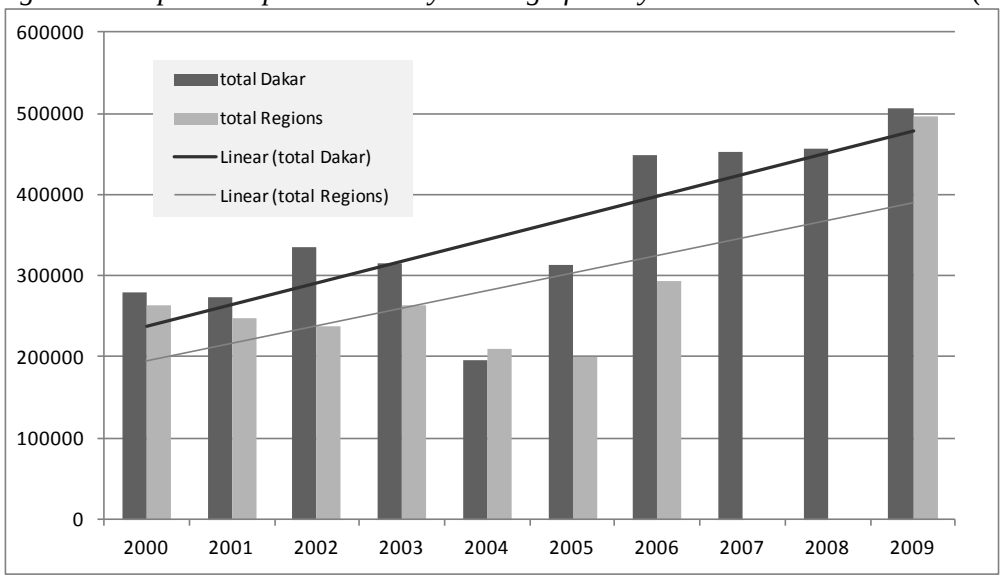
In Senegal, we have used three indicators of hospital effectiveness: (i) ambulatory activity (that is, outpatient visits), (ii) hospital activity (that is, hospital stays) and (iii) obstetrical activity (that is, deliveries and caesarean sections).

2.1.1. Ambulatory Activity Has Increased Sharply

Hospital ambulatory activity (that is, outpatient visits) has significantly increased during the period. Overall, the number of outpatient visits has increased by almost 20 percent every

year over the period 2000–09. This rate is clearly greater than population growth (average rate of population increase of 2.65 percent between 2000 and 2009). These data suggest that hospitals actually became more attractive to the population, at least for outpatient visits.

Figure 1. Hospital Outpatient Activity Has Significantly Increased over the Period (2000–09)



Source: Data provided by hospitals, and analysis by WB.
Note: For the years 2004 and 2005, some data are missing, and for the years 2007 and 2008, only data from Dakar hospitals were available.

This increase in ambulatory activity reflects a higher "attractiveness" of hospitals among patients. This increase in outpatient production could have been a nationwide trend, observed across all health facilities (not just hospitals). It is rather unlikely. Although it was not possible to obtain production data from all health facilities (hospitals and health centers) during the same period, it appears that, during 2003–08, the number of outpatient visits in health centers increased only by 23 percent. It is therefore clear that hospitals have increased their "market share" (at the expense of health centers).

This greater attractiveness is probably related to increased resources (including personnel) in hospitals. There is no study in Senegal on hospital care–seeking behavior. However, we can reasonably assume that the usual factors are at play: (i) cost of services, and (ii) perceived quality (as observed by the presence of qualified personnel and the availability of equipment). We will see later that the evolution of hospital prices is unclear. However, the number of qualified staff has increased considerably during the period. This factor probably contributed to make hospitals more attractive to the population.

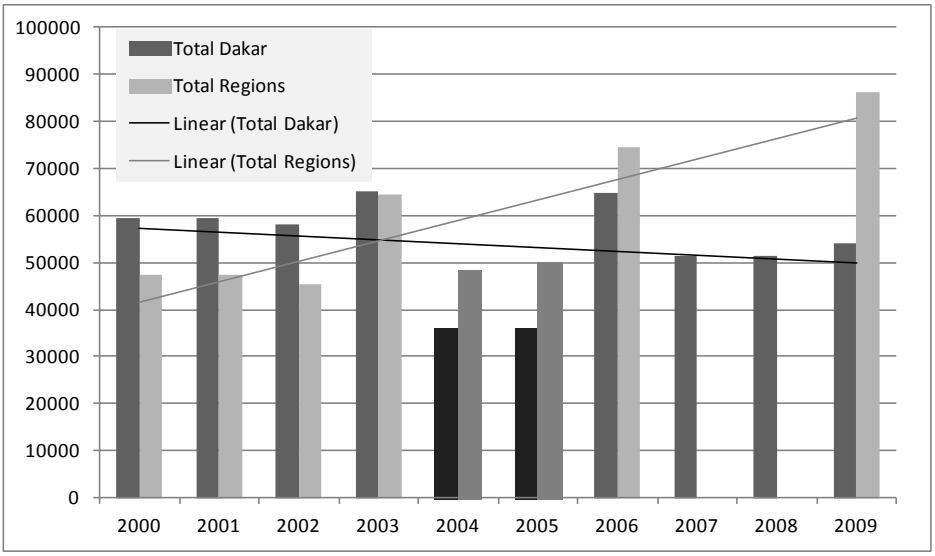
2.1.2. General Inpatient Activity Has Stagnated

Overall, the hospitalization rate[3] remained flat. The overall volume of hospital stays increased by only 31 percent between 2000 and 2009. But this corresponds to an annual increase of about 3 percent, which is not much greater than population growth. Therefore, one can safely conclude that the hospitalization rate of the population did not increase (unless, at

3. The hospitalization rate is simply the ratio of inpatient cases over population. In African low-income countries, hospitalization rates are generally low, mostly because of (i) the morbidity patterns, (ii) the overall poverty within population, and (iii) the low quality of hospital care.

the same time, the activity of hospitalization health centers had fallen sharply, which many actors doubt). Moreover, over the period, there is even a decrease in hospitalizations in Dakar hospitals, probably in favor of regional hospitals.

Figure 2. The Hospitalization (Inpatient) Rate Has Not Increased (2000–09)

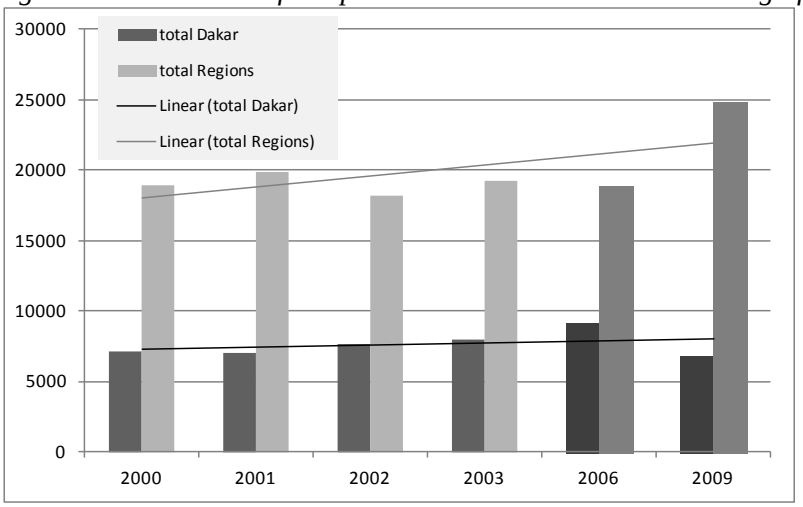


Source: Data provided by hospitals and WB analysis.
Note: For the years 2004 and 2005, some data are missing, and for the years 2007 and 2008, only data from Dakar hospitals were available.

2.1.3. Obstetrical Activity

The number of hospital-based births has not increased significantly, suggesting that the rate of hospital-assisted births has not improved. The number of births in hospitals increased very slightly: 21 percent over the period 2000–09, or nearly 2 percent per year. This increase is lower than the population growth and therefore lower than the growth of expected pregnancies. So there is obviously a stagnant hospital-assisted–delivery rate. In Dakar, the 2009 data even show a sharp decline, largely due to reduced hospital deliveries in Abbas Ndao (57 percent reduction between 2000 and 2009).

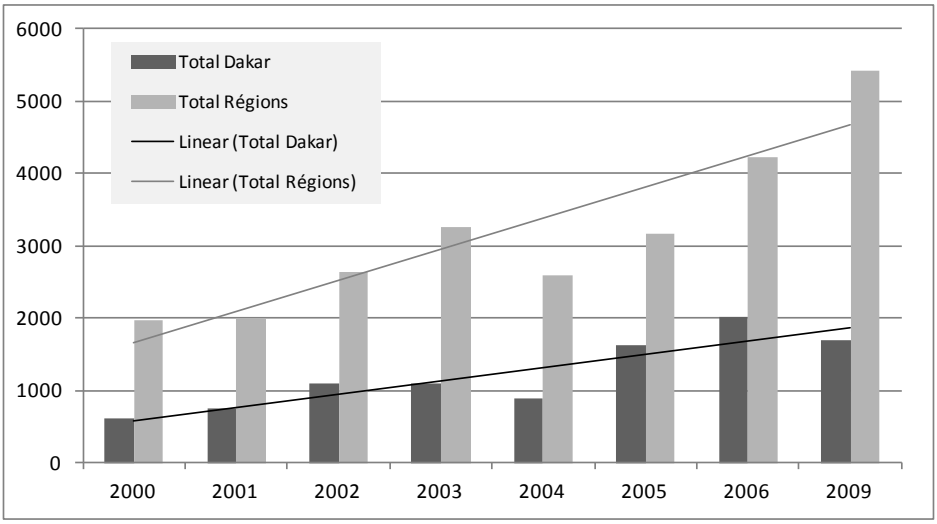
Figure 3. The Number of Hospital-assisted Deliveries Has Not Significantly Increased (2000–09)



Source: Data provided by hospitals, and analysis by WB.
Note: Years 2004, 2005, 2007, and 2008 are not represented because of the unavailability of data in several hospitals.

Conversely, the number of caesarean sections has more than doubled (over 175 percent) over the period 2000–09. Surprisingly, we find (see figure below) that this increase was very strong both in the regions and in Dakar, although the free caesarean section program was implemented only in regions and did not apply to hospitals in Dakar.

Figure 4. The Number of Caesarean Sections Has Boomed (2000–09)



Source: Data provided by hospitals, and WB analysis.
Note: For the years 2004 and 2005, some data are missing; data from the years 2007 and 2008 are not available.

Box 3. Are There Too Many C-Sections in Senegal? Why?

The number of caesarean sections in Senegal is obviously excessive as compared to the UNFPA recommendations. In total, the number of caesarean sections has risen by over 12 percent per year. Mechanically, the rate of caesareans (C-sections / births) rose from 12 percent in 2000 to 26 percent in 2006. This rate is clearly excessive, given the UNFPA recommendations (an adequate rate is between 5 and 15 percent).

The increased number of caesarean sections seems related to an effect of supply-induced demand. To explain this increase, we can eliminate the impact associated with the implementation of free caesarean sections programs. Indeed, the free caesarean sections started in January 2005 in five pilot regions and were extended to all regions (excluding Dakar) in 2006. We can see that the increase in caesareans appears well before these dates. Moreover, the increase is even faster in Dakar, although caesarean sections are not free there. The most likely explanation is related to the financial margin on caesarean sections. In Dakar, the actual cost of a caesarean section is estimated around 50,000 CFAF, while the charges generally run between 100,000 and 200,000 FCFA. In the regions (where C-sections are free and therefore hospitals are reimbursed by the government), the estimated cost is about 25,000 FCFA, while the government pays 50,000 FCFA. For hospitals, a caesarean section is one of the most profitable procedures (Witter 2010).

Source: Authors

2.2. QUALITY OF CARE MAY HAVE IMPROVED

Box 4. How to Measure Quality of Hospital Care?

The overall quality of hospital care is particularly difficult to measure, especially in Senegal. Internationally, there is indeed no consensual criterion for objectively measuring quality of hospital

care.[4] Also, the Senegalese hospitals, despite some commendable efforts, have not really established any quality assurance systems. Tools as simple as a procedure for allowing patients to complain formally or the systematic implementation of an annual survey of satisfaction were not found in any of the Senegalese hospitals.

In total, the absence of data leaves us with only the level of hospital activity as an index of its attractiveness (to the population) and hence as a proxy for quality of offered services.

Source: authors

The significant increase in hospital production suggests that the quality of hospital care (at least for outpatient activities) has improved. The fact that the growth of hospital activity has increased may be seen as a sign of improving quality of care, given that quality of care is often a key factor for attracting patients in hospitals.

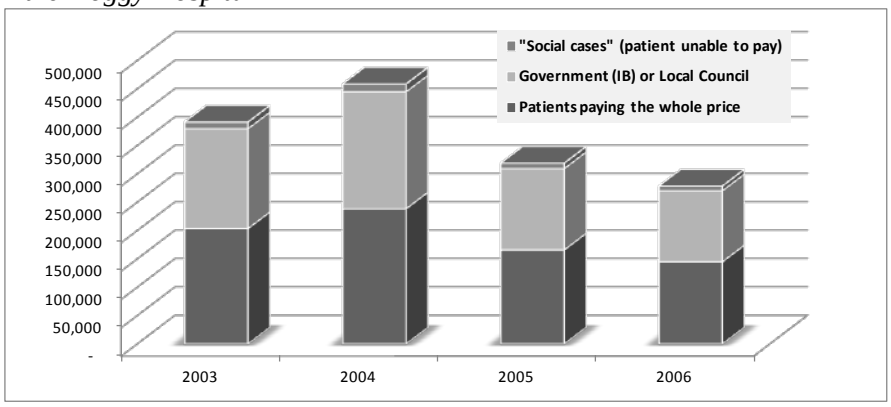
2.3. EQUITY IN ACCESS TO HOSPITAL CARE HAS DECLINED

Data on equity of access to hospital care is extremely scarce. The various household surveys do not distinguish the use of hospitals from the use of health centers. Similarly, the socioeconomic profile of hospital patients is poorly monitored by hospitals. Interestingly, the equity dimension was rarely mentioned by the actors interviewed. Yet this is the dimension that was the most (negatively) affected by the reform.

Analysis of available data suggests that the proportion of the poor attending hospitals, already low, has stagnated or declined. For one hospital (Hoggy), we attempted to estimate the socioeconomic profile of patients on the basis of data on sources of revenues. The figure below shows the evolution of direct outpatient revenue[5] structure for Hoggy between 2003 and 2006. One can see that the share of "social cases"[6] (presumably poor) did not go beyond 3 percent of direct revenues of this hospital. Comparable figures have been collected in Pikine Hospital, where, in 2007, social cases represented 0.3 percent of outpatient visits and 3.8 percent of hospitalizations.

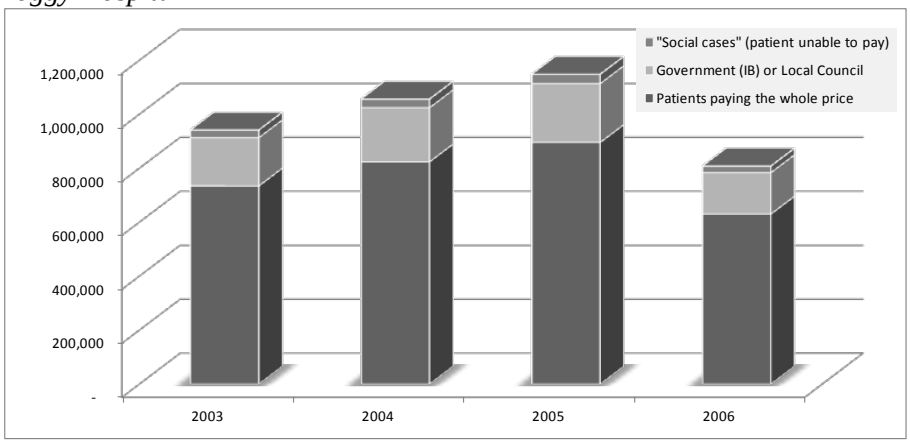
4. A very simplistic indicator of quality of care would have been the Average Length of Stay (ALOS). This ALOS decreased by 31 percent between 1999 and 2006, from 7.14 to 4.87 days. One could view this decline as a sign that quality of inpatient care has improved. However, many respondents have indicated that this decline is most probably due to the fact that families of hospitalized patients strive to have them discharged as quickly as possible to avoid paying huge costs. For this reason, we ruled out ALOS as an indicator of quality of care. In fact, this ALOS decrease could suggest that hospital care has become less affordable.
5. As always in accounting, revenues here correspond to the services and goods that have been charged. As such, the total revenues provide a reasonable proxy for total production. Revenues are different from actual cash receipts, especially as some clients cannot pay.
6. There is no clear definition for "social cases." Senegalese hospital managers use this term to refer to patients who cannot pay.

Figure 5. Patients Who Are Unable to Pay Accounted for Less than 3 Percent of Outpatient Revenues in the Hoggy Hospital



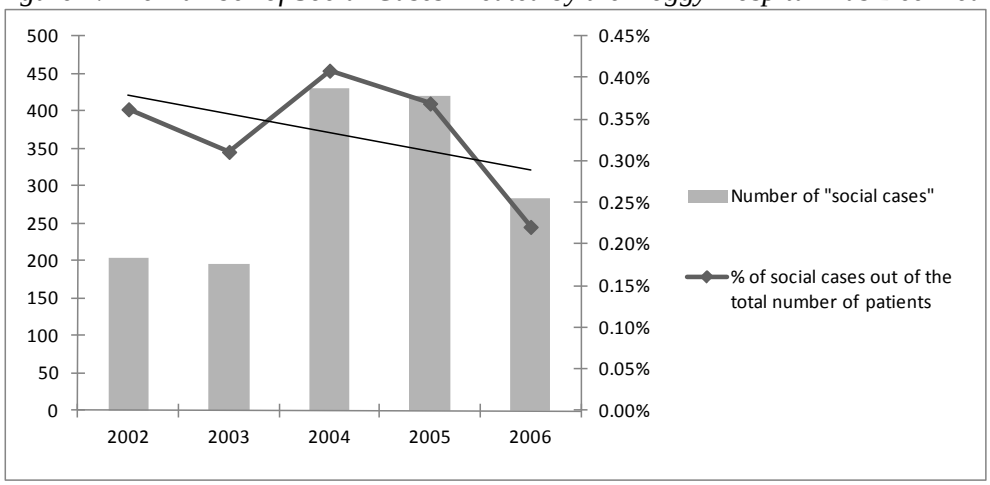
Source: Data provided by Hoggy hospital, and analysis by WB.
Note: Similarly, on hospitalization, the social cases remained at 3 percent of total revenues.

Figure 6. Patients Who Are Unable to Pay Amount to Less than 3 Percent of Inpatient Revenues in the Hoggy Hospital



Source: Data provided by Hoggy, and WB analysis.
Note: Also in Hoggy hospital, but this time in terms of the number of patients, the proportion of social cases has declined from 0.36 to 0.22 percent during the period.

Figure 7. The Number of Social Cases Treated by the Hoggy Hospital Has Declined during the Period



Source: Data provided by the Hoggy hospital, and analysis by WB.

However, according to the recent ESPS and ESAM surveys, the poor are still nearly 51 percent of the Senegalese population. So it is obvious that hospitals are serving this population only in a marginal way and that the hospital reform had no positive effect on this point.

2.4. EFFICIENCY AND FINANCIAL SITUATION OF HOSPITALS HAVE DETERIORATED SHARPLY

In this section, we propose an estimate of the technical efficiency of hospitals in Senegal (2.4.1), before exploring the evolution of their financial situation (2.4.2).

2.4.1. The Technical Efficiency of Hospitals Has Declined

*Box **5.** How to Measure Hospital Efficiency and Productivity?*

Strictly speaking, the technical efficiency of a hospital is the distance between (i) its combination of inputs and outputs and (ii) the frontier of efficient production. This distance can be measured by a DEA (Data Envelopment Analysis) method, as used here (see details in appendix 3).

It would have also been interesting to explore productivity[7] through an indicator such as the average cost per stay, but this would require (i) the existence of a detailed and uniform management accounting system in all hospitals and (ii) an estimate of case-mix loads for each of these hospitals. As mentioned above, none are available in Senegal.

Finally, it should be noted that the **bed occupancy rate** is an indicator often used to estimate productivity of hospitals. For information, this rate is simply the following ratio:

$$\frac{number\ of\ produced\ inpatients\ days}{number\ of\ available\ beds * 365\ days}$$

Yet this indicator is highly questionable and therefore was not used here. Its first weakness is with the number of beds. The number of available beds may be different (usually smaller) from the official number of beds. Some "officially available beds" can actually be unavailable because of rehabilitation works in a department, for instance. This distinction between "official" and "available" beds allows all sorts of manipulations of the denominator and therefore makes it difficult to interpret this rate.

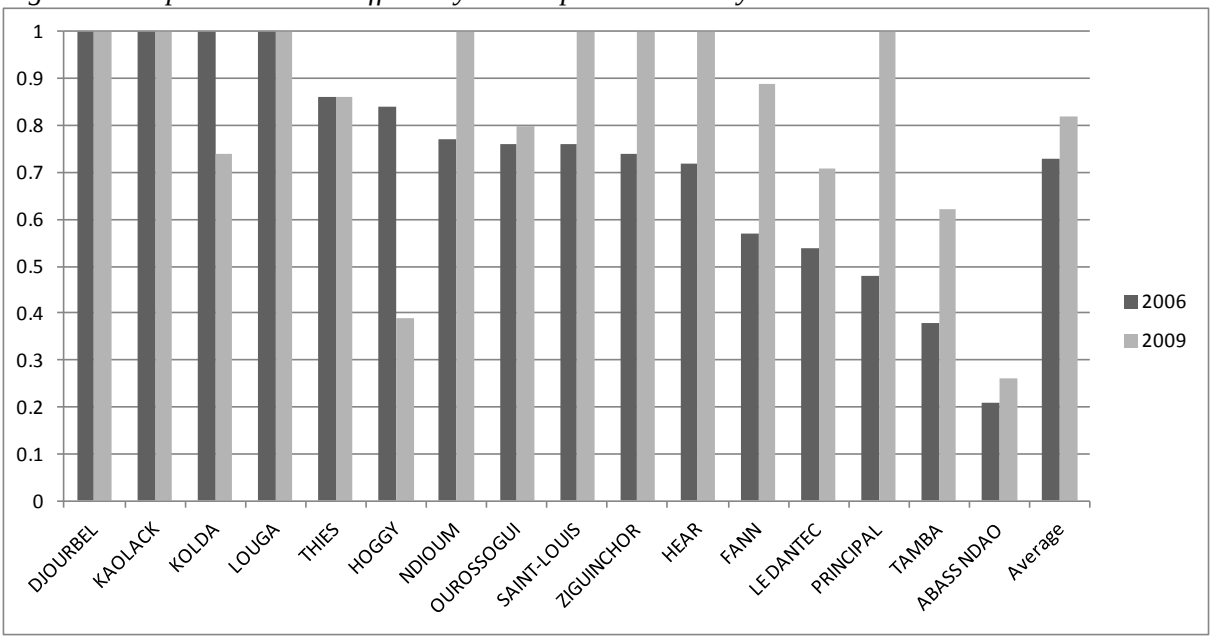
But more fundamentally, the number of beds is less and less a good predictor of the production capacity of a hospital. This is true in developed countries, where the expansion of day surgery and declining lengths of stay have reduced the relevance of bed capacity. This is also true in low-income countries where hospitals are often still primarily outpatient facilities (at the expense of inpatient activity). In fact, the true capacity of a hospital depends much more on its workforce (that is, qualified staff) and less on its number of beds. That explains why many African hospitals have low bed occupancy rates. This situation is related less to an excess of beds than to a lack of qualified staff. Using the bed occupancy rate as an indicator of efficiency is therefore a misleading practice.
Source: authors

The technical efficiency of hospitals in Senegal is still relatively low, but it has been improving in recent years. We conducted a DEA (Data Envelopment Analysis), as is customary now for the analysis of hospital technical efficiency (see annex 3 for details of the methodology and calculation). This analysis was carried out twice, with data from 2006 and from 2009. According to this analysis, the index of technical efficiency of hospitals in

7. In theory, efficiency and productivity are two distinct concepts. Productivity is simply the ratio of outputs over inputs, while efficiency is the distance between an existing combination of inputs/outputs and the ideal combination (as defined by an efficiency frontier). In practice, the two concepts provide similar results. In this report, they are used interchangeably.

Senegal was **73 percent** in 2006. While not catastrophic, this index is quite insufficient. Indeed, **a 73 percent efficiency index means that 27 percent of inputs (mostly qualified staff) do not contribute at all to hospital production**. In 2009, this index increased to 83 percent, which is evidence that the restructuring plans launched in 2008 were beginning to have some impact. The figure below presents (in histograms) the indexes of technical efficiency for each of the Senegalese hospitals. It is worth noting that the hospitals located in the capital city (i.e. the last 6 on the right below) are usually much less efficient than the hospitals in regions.

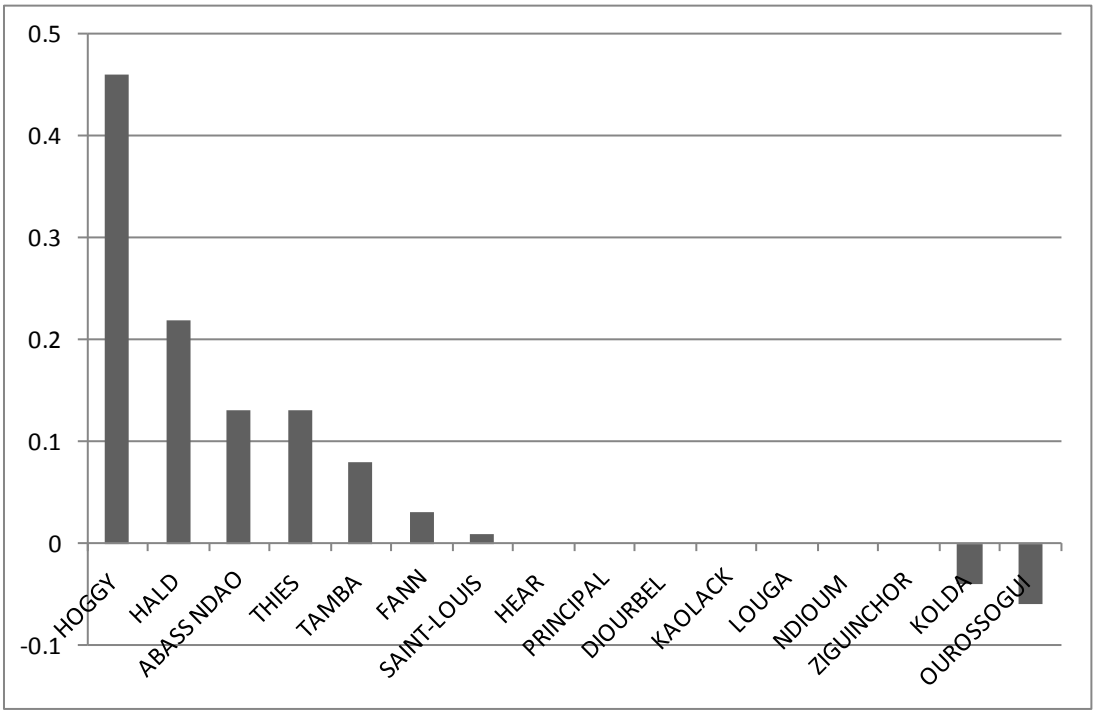
*Figure **8**. Hospital Technical Efficiency Has Improved Recently but Is Still Rather Low*



Source: Data provided by hospitals, and analysis by WB.
Note: The histogram bars represent the level of technical efficiency (ranging from 0 to 1) of each hospital as estimated by the DEA algorithm. "1" corresponds to a perfect efficiency.

The size (in number of beds) of hospital in the capital city is usually excessive. The DEA method also allows assessing the situation of hospitals in terms of scale economies. In other words, it provides an answer to the following question: Is hospital X too big (that is, decreasing returns) or too small (that is, increasing returns)? In Dakar, almost all hospitals are clearly too big, as shown in the figure below.

*Figure **9**. Most of the Hospitals in Dakar Are Too Large (2009)*



Source: Data from hospitals, and analysis by WB.
Note: The histograms correspond to the scale economy index of each hospital:

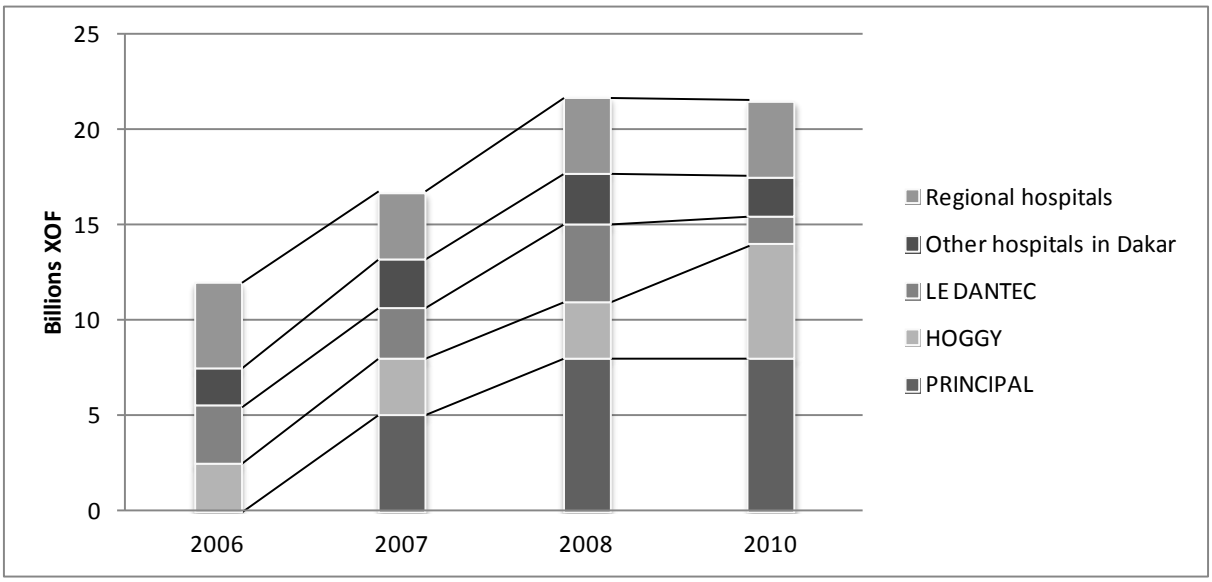
- When this index is positive, the corresponding hospital is in a situation of decreasing returns. Its size (that is, in bed or staff) is therefore too large.
- Conversely, when the index is negative, the hospital is in a situation of increasing returns and should increase its size.

The technical efficiency of hospitals has deteriorated, at least until 2008–09. Because of insufficient data, the DEA analysis could not be performed for the period preceding the 1998 hospital reform. However we will see later that, during the period 2000–06 the quantity of inputs (including staff) grew much faster than the quantity of outputs. It is therefore clear that the efficiency of the sector deteriorated, at least until 2008.

2.4.2. Many Hospitals Are Close to Bankruptcy

Hospital debt has spiraled since the implementation of the hospital reform. At the end of 2010, the hospital debt was about 22 billion FCFA (approximately $45 million). The increase is rather recent, given that this debt amount was only 11 billion FCFA in 2006. It has stabilized in 2008, when the first cost-cutting efforts were implemented. Also, this hospital debt is concentrated among the Dakar hospitals (81 percent of the total amount), and especially for two of them: Hoggy (28 percent) and Principal (37 percent).

*Figure **10**. Hospital Debt Has Boomed Since 2006, but Is Now Stabilized*

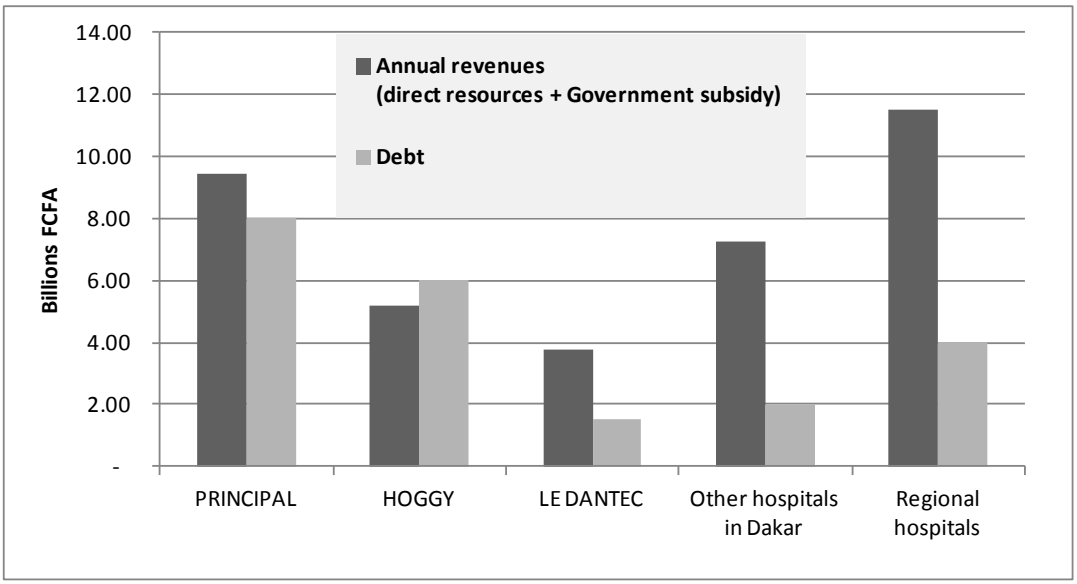


Source: Data from hospitals, and analysis by WB.

Several hospitals do not have the financial capacity to reimburse their debt, a situation that has led to payment defaults and to the (illegal) transfer of some expenses to patients. It is noteworthy that neither hospitals nor the Ministry of Health closely monitors indicators on financial management. It is therefore quite difficult to assess the degree of solvency and liquidity of hospitals. On the basis of available information, it has nevertheless been possible to estimate the ratio between (i) net debt (that is, total debt — total account receivables) and (ii) annual revenues[8] (that is, direct resources + subsidy from the MoH). In the figure below, it appears that the two most indebted hospitals (Hoggy and Principal) have a gross debt amount similar to their annual revenues. Such a debt level is obviously not sustainable. The consequences of these debt levels are not clearly known, but two aspects are striking. First, several hospitals decided to stop paying their suppliers (for drugs and medical supplies). In turn, these suppliers have either increased their prices or stopped all deliveries. Incidentally, many patients are now required to purchase their drugs by themselves. Another effect of this high debt level is that several hospitals have started to refuse patients without health insurance coverage. This occurred especially with the elderly, whose health care is supposedly free (that is, reimbursed to hospitals by the government under the Plan Sesame). Overall, for hospitals, the priority has been to preserve their financial capacity to pay the salaries and bonuses of their staff, at the expense of drugs and supplies for patients. This reaction inevitably worsens the inequitable nature of hospital care in the country.

8. It would have been much better to use the net income instead of annual revenues. But, in Senegalese hospitals, the net income is generally negative.

*Figure **11.** In the Two Most Indebted Hospitals, Debt Levels Are Not Sustainable*



Source: MoH data (year 2010), and WB analysis.

The main reason behind this massive debt is that the wage bill has increased much more rapidly than revenues. As we will see later, the number of hospital staff has increased by 113 percent over the period, while total revenues have increased by only 75 percent.

Another reason (less important) is the structural underfunding of the free care programs (especially the Plan Sesame). The next section describes how hospitals in Dakar must face huge amounts of accounts receivables, most of them being generated by the fact that government is not adequately reimbursing hospitals when they provide free care to elderly people. This problem is a major concern for two hospitals: Le Dantec and Principal.

Finally, another reason is the weak capacity of hospitals in financial management. Most hospitals have enough skilled staff in general accounting and budget planning. But their capacities in cash management and other aspects of financial management are very weak. None of the surveyed hospitals could provide a cash management plan. The very simple notion of working capital was unknown among hospital financial managers. This situation is especially worrying given that hospitals benefited from numerous training sessions during the implementation of the hospital reform. Whatever are the causes of this hospital debt, not much progress can be expected without a major and quick strengthening of capacities in financial management.

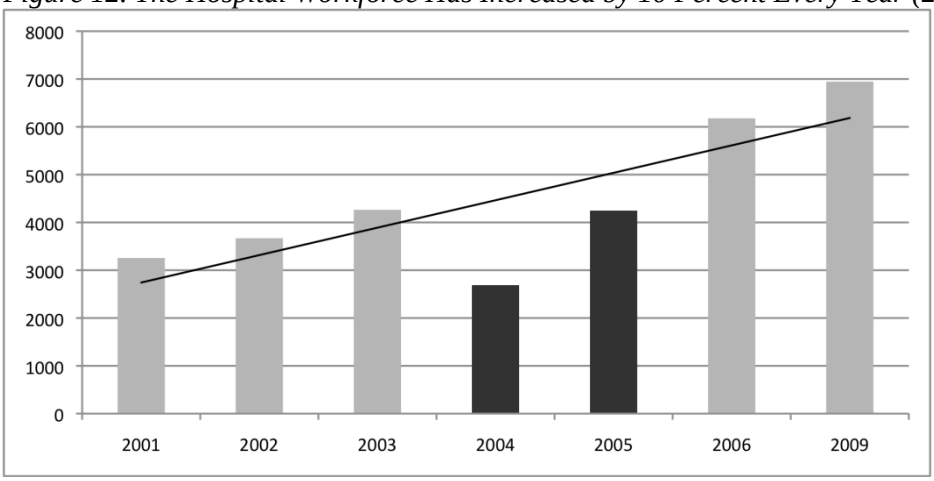
2.4.2.1. Staff Costs Have Increased Tremendously

Inefficiencies and financial difficulties of the Senegalese hospitals are largely related to the increased staff costs, which are themselves the product of (i) an increase in recruitments that is completely unrelated to actual production, and (ii) an increase in the average salary cost (mostly with the creation of new bonuses).

2.4.2.1.1. Recruitments have spiraled, especially for nonqualified staff

Since 2001, the hospital workforce has more than doubled, growing by 113 percent over the period (that is, more than 10 percent annually on average).

Figure 12. The Hospital Workforce Has Increased by 10 Percent Every Year (2000–09)



Source: Data provided by hospitals, and analysis by WB.
Note: For the years 2004 and 2005, data from some hospitals are missing. In addition, 2007–08 data for some hospitals were not available.

Two distinct phenomena equally explain this increase in staff costs. First, during the implementation of the reform (1999–2001), most hospitals "regularized" some of their staff, especially volunteers or interns. These categories of staff were usually paid a very low monthly salary of around 10K to 20K FCFA by the health committees and legally had no contract with hospitals. Under intense pressures from local politicians and union leaders (sometimes with physical violence), the hospital directors regularized these staff members, that is to say, they were offered a contract with, inevitably, a very significant increase in their pay (often around 60K FCFA per month). Only a few hospitals were able to resist this pressure (for instance, the regional hospital of Thies). For many others, the corresponding increase in workforce has often been massive. For example, for the hospital Le Dantec (HALD), these recruitments corresponded to about 400 people, which resulted in the doubling of the existing workforce. In addition, these personnel were often unskilled, which did little to improve hospitals efficiency. For example, at HALD, 61 percent of so-called "clinical" staff are not qualified, not to mention the administrative and logistical staff. Many hospitals now have a workforce structure heavily biased in favor of administrative and logistic staff. For example, at Hoggy Hospital, the share of nonclinical jobs (clerical, technical, and logistical) is now 34 percent, while a "norm" (such as in French hospitals) would be less than 22 percent. Similarly, in HALD, this share is 31 percent.

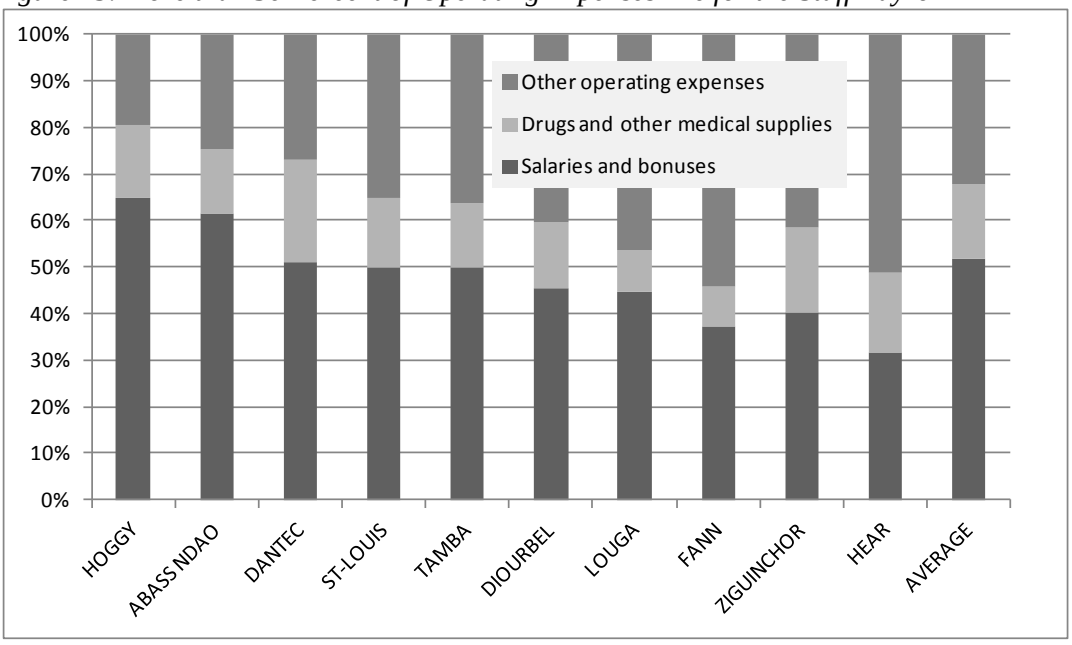
Second, after this massive regularization, hospitals have often continued to recruit, at a more reasonable pace this time and as much as possible to attract qualified personnel. To justify these additional recruitments, hospitals have usually claimed that they had a low number of qualified staff. Hospitals do not complain much about a shortage of physicians (although this problem exists in regional hospitals). Indeed, the government made a great effort at the beginning of the reform, as many doctors (that is, civil servants) were recruited and then posted in hospitals. That probably explains the quick increase in production (see previous section). The problem is mainly about nurses. We therefore carried out a rapid assessment of

paramedical staff ratios (see annex 2 for details). It shows that the shortage of nurses is not found in all the 20 hospitals. We are instead observing an overall oversupply of about 100 nurses, nationwide. However, it is true that several regional hospitals face a nurse shortage, which could, in theory, be addressed by the transfer of nurses from Dakar to the regions.

2.4.2.1.2. Average wage costs (salaries and bonuses) have also boomed

The average wage cost has increased dramatically. Staff costs make up the bulk of operating costs of hospitals (an average of 52 percent as shown in the figure 13 below). To estimate the evolution of staff costs, an analysis was performed on a sample of eight hospitals, whose data was available between 2004 and 2009.[9] The result (figure 14 below) shows an increase of 121 percent between 2004 and 2009, confirming other information collected (see below).

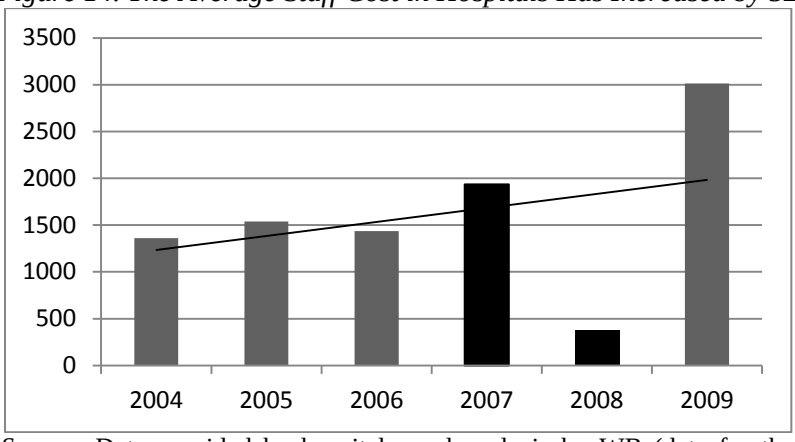
Figure 13. More than 50 Percent of Operating Expenses Are for the Staff Payroll



Source: 2005 data provided by hospitals, and analysis by WB.

9. Because of a lack of data, no adjustment was made to take into account the structure of staff qualifications, although we concede that this is an important parameter to understand the average staff cost. For instance, a hospital may have a high percentage of qualified staff due to recent recruitments. This will automatically increase its average staff costs, even if no salary increase or bonuses has been given.

Figure 14. The Average Staff Cost in Hospitals Has Increased by 52 Percent over the Period 2004–09



Source: Data provided by hospitals, and analysis by WB (data for the years 2007 and 2008 were not fully complete).

Indeed, salary increases and bonuses have been allocated very generously. For example, in 2007, when it was already facing a major financial deficit, the St. Louis Hospital had increased the salaries of its nursing staff by 53 percent (see box below).

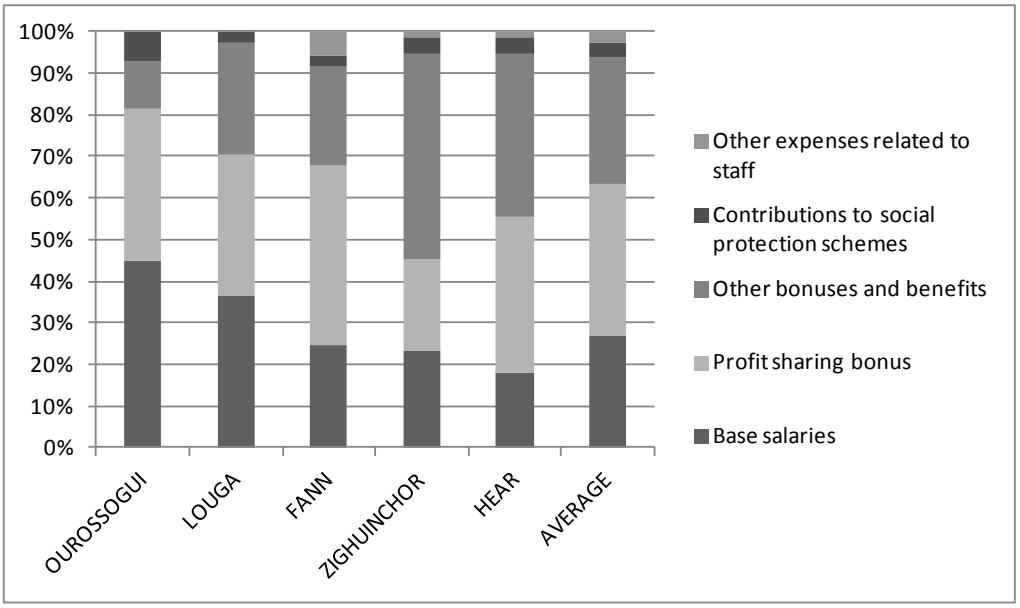
Box 6. An Example of an Uncontrolled Increase in Labor Costs: The St. Louis Hospital

The St. Louis Hospital (LSH) faced a deficit of about 80 million CFAF in 2006 and then 60 million FCFA in 2007.
Several decisions related to staff compensation easily explain these deficits:
- An increase in wages of health workers (+28 million FCFA),
- A doubling of the amount of the "qualification bonus" (+3 million FCFA),
- An increase of the amount of the housing allowance (+5 million FCFA),
- An increase of the "responsibility bonus" (+2 million FCFA).

In total, nearly 40 million FCFA are increases of salary or bonuses.
If we add the regularization of volunteers (amount not quantified), we arrive easily at the conclusion that this hospital would not be in deficit if it had kept some control of its payroll.

To attract or retain staff, hospitals have massively created or increased bonuses, without ensuring beforehand that these decisions would not jeopardize their financial situation. Today, **more than 67 percent of staff costs are devoted to bonuses and allowances** (see figure below). Among all bonuses (see appendix 1 for a quick inventory of bonuses), the largest one was the profit-sharing bonus (*prime d'intéressement*), accounting for about 37 percent of staff costs. With this *prime d'intéressement*, each hospital is allowed to allocate between 0 and 25 percent of its direct revenues as staff bonuses. Unsurprisingly, most hospitals (St. Louis, Le Dantec) chose the maximum rate (25 percent), without any prior study in its financial realism. Moreover, for this bonus, the amount should theoretically be based on the actual revenues of hospitals. In practice, it is calculated on the basis of forecasted revenues. In some hospitals, the bonus amount is even guaranteed for staff and has therefore no longer any connection with the forecasted or actual revenues. Overall, while a profit-sharing bonus is in principle a good mechanism for increasing motivation, its implementation has been catastrophic. The *prime d'intéressement* became a sort of financial "infernal machine," contributing significantly to the bankruptcy of several hospitals. Finally, it is clear that hospitals created incentives that were often overlapping with those paid by the government. This is especially true for physicians, who have been offered, in addition to the responsibility bonus already paid by the government, qualification bonuses if they were not department heads.

Figure 15. Among Staff Costs, the Profit-sharing Bonus Is the Biggest Expense



Source: Data provided by hospitals (for NHA), analysis by WB.

In defense of hospitals, it is worth mentioning that some bonuses' creations corresponded to a "spillover effect" of the government decisions. The government has indeed created[10] or increased[11] bonuses for its civil servants, leaving hospitals with no other choice than to follow (or try to follow) for their own contract-based staff, to retain them. In particular, some of these new bonuses are among those planned by the special status of health workers, a status that was never implemented despite a memorandum of understanding signed with the unions (in 2005 and again in 2008). In general, the disparity of status within hospital creates a lot of bad will among health workers. It is indeed not uncommon for health workers with similar training and experience, working within the same service, to have different status (and therefore compensation).

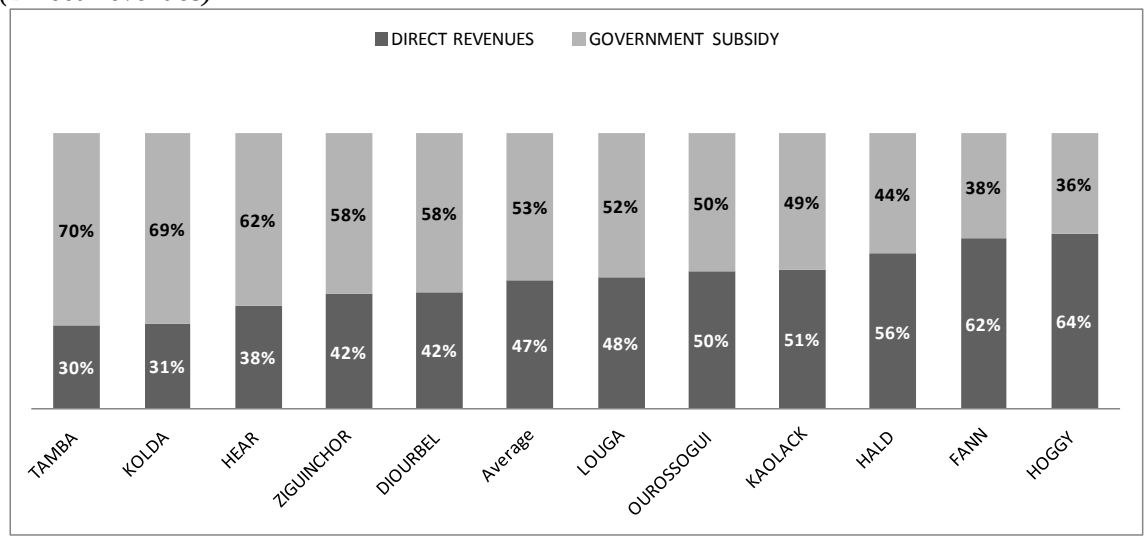
2.4.2.2. Revenues Have Increased Slowly and Inconsistently

For their operations, hospitals have essentially two types of revenues:

(i) **an operating subsidy** paid annually by the government and
(ii) **direct revenues** out of user fees charged to patients or to their health plans.
We also explored the impact of uncollected revenues related to social cases and poor patients.

10. Responsibility bonus (*prime de responsabilité*) for doctors in 2006.
11. Risk bonus (*prime de sujétion et de risque*) increased in 2004–05.

Figure 16. On Average, 47 Percent of Operating Revenues Are Obtained through Charging Patients (Direct Revenues)

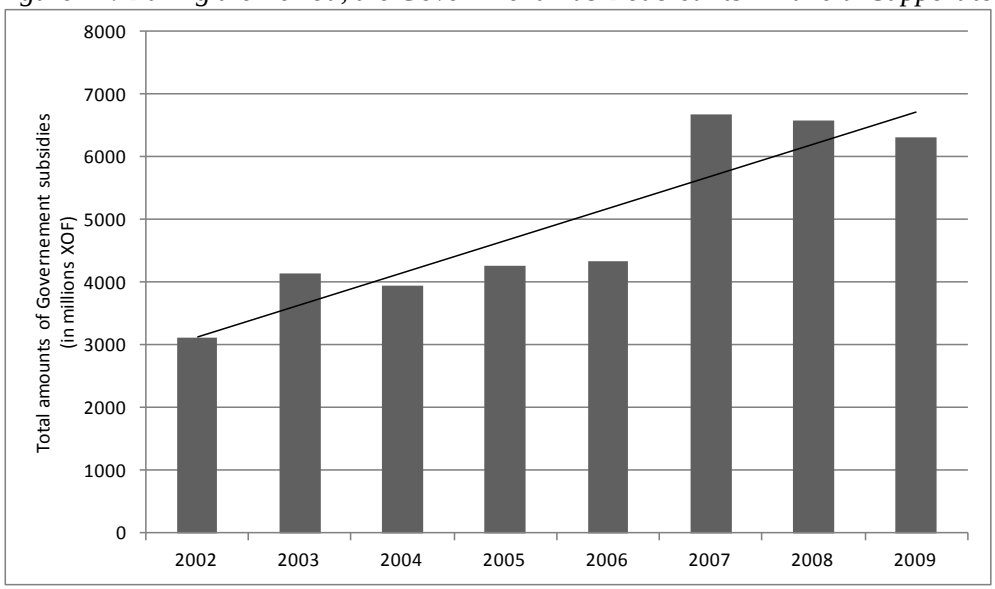


Source: Data for 2009 provided by hospitals, and analysis by WB.

2.4.2.2.1. The amounts provided through government-operating subsidies have little to do with the actual production of hospitals

Through annual operating subsidies, the government has significantly increased its financial support to hospital.

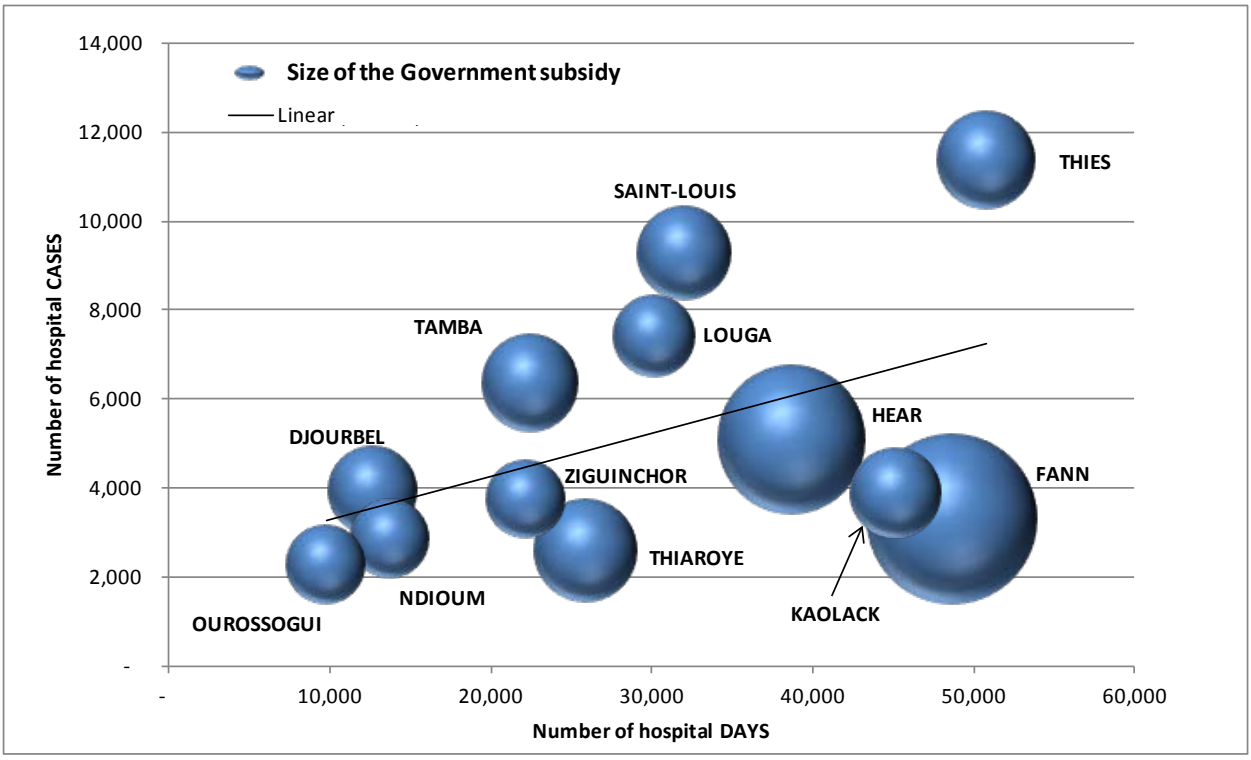
Figure 17. During the Period, the Government Has Doubled Its Financial Support to Hospitals



Source: Data from hospitals, and analysis by WB.

Accounting for about 53 percent of operating revenues, the operating subsidy is based on historical data that poorly reflect the actual workload of hospitals. For each hospital, we compared (i) their operating subsidy and (ii) their workload (number of hospital days or number of hospital cases).

Figure 18. There Is No Logical Linkage between Hospitals' Production and Government Subsidy Amounts



Source: Data (year 2009) provided by hospitals, and analysis by WB.

From the figure above, an obvious finding is that two hospitals (Hear and Fann) receive much more than they should normally receive. But these two hospitals are providing highly specialized care and therefore have a heavier case-mix load than the other hospitals. Consequently, it is not surprising that they receive higher subsidies.

What is more puzzling is that many hospitals receive roughly the same amount while their production levels are very different. For instance, Thies is receiving the same amount as Diourbel, yet Thies' production is at least three times higher than Diourbel's. Obviously, Diourbel benefits from a relative "rent." Overall, Dakar hospitals look heavily subsidized. When Le Dantec,[12] is included, it appears that Dakar hospitals receive about 71 percent of all government subsidies', while they represent only 48 percent of the hospital production.

Indeed the method for allocating operating subsidies is far from rational and therefore generates rents and disincentives among hospitals. For all hospitals, the subsidy amount is mainly based on historical decisions. Some hospitals (especially those in Dakar) receive a subsidy much higher than their production, which does not encourage them to improve their productivity. One can even think that the surge in recruitment is partly explained by these generous allocations. Why try to control costs when one receives a guaranteed and inflated income? Conversely, regional hospitals receive relatively small subsidies compared to their production. So they have no incentive to increase their production, as they know that the subsidy will not catch up. Moreover, these regional hospitals have to deal with poorer populations and therefore cannot easily compensate a low subsidy with direct revenues (that

12. We did not include this observation, so that the figure could be clearer.

is, payments by patients). This situation is even sadder given that it would be relatively easy to develop a fairer allocation method. For instance, simply allocating subsidies according to the number of outpatient visits and inpatient days would be an easy and positive step forward.

2.4.2.2.2. Direct revenues: Have hospitals suffered from lower rates?

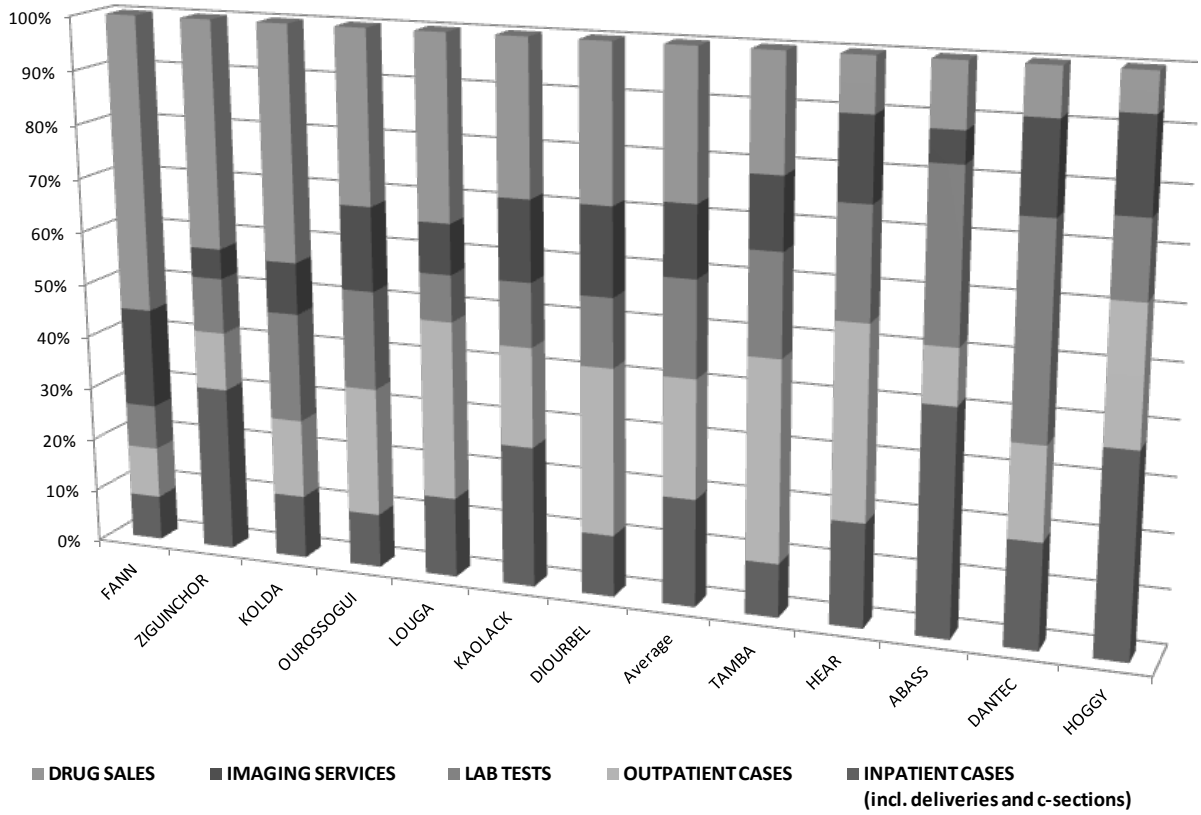
The rates that hospitals can charge for their services have been modified in 2005 without ensuring consistency between these rates and actual costs. Until 2005, hospitals could set their rates freely. The decree of February 21, 2005, set minimum and maximum rates for each service. Note that the method of preparation of this decree was rather strange. A feasibility study was apparently conducted in 1999. But nobody in the MoH could locate this study. And it took six years to prepare the decree. Overall, it is difficult to find any evidence that these new rates were defined in accordance with actual costs.

Consequently, in the absence of cost-accounting–systems for hospitals, it is difficult to confirm the claims made by hospital managers that rates are too low compared to actual costs. A point usually made by hospitals (to explain their financial difficulties) is the impact of the rate decree of 2005. Many informants actually emphasized the fact that the 2005 rates had mostly been set to bring down prices (and therefore to improve accessibility) and not to allow hospitals to charge their actual costs. Some hospitals (including Hoggy, which is mostly funded by direct revenues, cf. figure below) have clearly suffered from these new rates (cf. Hoggy 2006). For others, the impact was neutral (for example, Thies). For Thies, a cost analysis was available in 2005. Most costs were adequately covered by the new rates and the operating subsidy. For example, a normal delivery is charged 10,000 CFA francs, while the full cost was estimated in 2005 at 14.737 FCFA. Since the operating subsidy covers on average, 57 percent of actual costs, it is reasonable to think that the difference between the charged rate (10,000 FCFA) and the actual cost (FCFA 14.737) is more than offset by the operating subsidy.

The rate structure seems to encourage hospitals to favor diagnostic procedures (laboratory tests and imaging) rather than outpatient visits or hospitalization. As shown in the table below, on average, over 55 percent of direct revenues come from charging nonclinical services, such as imaging and laboratory tests. Several informants have suggested that the existing rate structure pushes hospitals to overproduce these types of services, (which are more profitable, partially because of scale economies) at the expense of clinical production. More generally, this rate structure also encourages hospitals to become facilities for outpatient diagnostic and to shy away from pure hospital activity.[13]

13. This situation is not limited to Senegal. In many low-income African countries, hospitals look more like diagnostic centers than surgical and inpatient care facilities.

Figure 19. Drug Sales and Lab/Imaging Tests Account for the Bulk of Hospital Direct Revenues



Source: Data from 2009 provided by hospitals, and analysis by WB.

2.4.2.2.3. Direct revenues: the costs related to poor patients are not adequately covered by subsidies

The increase in financial losses related to insolvent patients is often presented by hospitals as a key problem, although available data seem to invalidate this view. Several hospital managers indeed claim that their facilities are facing a growing financial burden related to "social cases" (that is to say, patients unable to pay). They therefore want a special subsidy to be provided by the government. Yet the information available casts doubt on the seriousness of this problem. For example, in the St. Louis Hospital in 2006, costs generated by poor patients were estimated by the hospital at around 3.5 million CFA francs, or only 0.25 percent of its total expenditures. This estimate is confirmed by data collected at other hospitals. The table below shows that in 2005 (latest data available) the financial gap related to social cases rarely exceeded 2 percent.

Table 1. Structure of Direct Revenues in Five Institutions, 2005 (percent)

	Abass N'Dao	Fann	Hoggy	Louga	Ziguinchor
Health mutual	n.a.	n.a.	0.43	0.13	n.a.
Government	n.a.	7.71	14.75	0.63	8.92
Social Security Fund or IPRES	n.a.	n.a.	1.65	4.08	n.a.
IPM	3.25	6.65	24.78	0.81	n.a.
Hospital staff	2.07	n.a.	3.88	n.a.	n.a.
Social cases	**1.42**	**5.76**	**1.24**	**1.15**	**2.32**
Other health plans	n.a.	1.71	n.a.	n.a.	1.65
Patients out-of-pocket expenses	93.26	78.16	53.27	93.20	87.10

Source: Data provided by hospitals for the preparation of the National Health Accounts (NHA; analysis by World Bank.

However, it is true that some hospitals have suffered heavily from the underfunding of the free care program for the elderly (Plan Sesame). The implementation of the Plan Sesame started in late 2006. Two problems are highlighted by the hospitals: (i) reimbursements for free care provided to the elderly are transferred with delays; (ii) these payments do not cover all costs. On the first issue, the late reimbursements appear to have been offset by the provision of advances to hospitals. The second issue is more serious, as demonstrated by the following calculation. About 700 million CFA francs are allocated annually to the Plan Sesame. Given that the number of potential beneficiaries is about 650.000 people, the average subsidy per beneficiary is 2,000 FCFA. This is a very small amount (about the cost of only one outpatient visit).

Box 7. A Free Care Program for the Elderly: the Plan Sesame

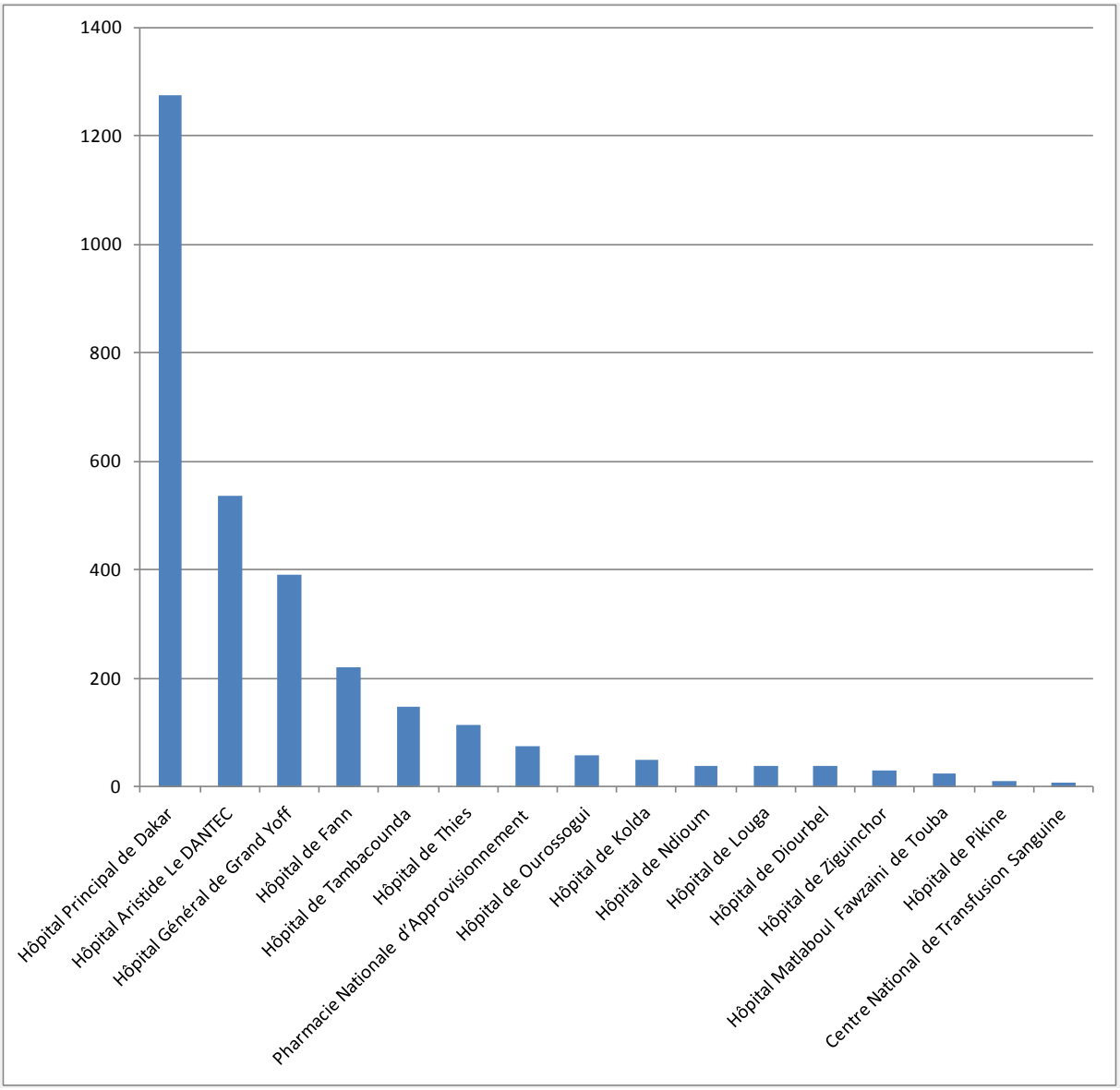
In 2006, the president of the Republic of Senegal introduced the Plan Sesame for providing free care to the elderly. Under this program, any individual aged 60 and over is considered an elderly person. Of these, only 30 percent already had some health coverage, provided by the IPRES[14] and the FNR.[15] The remaining 70 percent were not covered. In 2006, there were about 650,000 elderly (with an annual growth of 2.5 percent), all potential beneficiaries of the Plan Sesame.

The Plan Sesame was intended to provide coverage for two types of out-of-pocket (OOP) expenditures:
(i) Funding for the copayment paid by retirees covered by IPRES and FNR (that is, before the Plan Sesame, they had to pay 20 percent of the costs);[16]
(ii) Funding for all OOP expenditures of retirees not covered by IPRES or FNR.
The IPRES has allocated 300 million CFAF to the Plan Sesame to have hospitals prefinance care for its retirees. Similarly, a grant of 700 million CFA was transferred to the Plan Sesame by the government.

14. IPRES: Institute of Pensions in Senegal.
15. FNR: National Pension Fund.
16. In addition, the MoH signed a convention with the IPRES so that retirees covered by IPRES could benefit from preferential rates in hospitals.

Since the start of the program, the government has prefinanced hospitals and health care centers for an amount of 2.2.billion FCFA, which is about 43 percent of actual expenses. As can be seen on the figure below, 80 percent of the amount owed by the government to hospitals is concentrated in Dakar hospitals (with 42 percent for the "Principal" hospital).

Net Debts of the Plan Sesame for Hospitals (in millions CFAF)



Source: IPRES 2009, and WB analysis.

With about 3 billion FCFA (about $6 million) owed by the government to hospitals, the Plan Sesame can be considered virtually bankrupt. There are several reasons for explaining this situation:

1. The government underestimated the average health care expenditures of elderly people. Even in considering only the estimate of 650,000 potential beneficiaries, the average amount by beneficiary was less than 2,000 FCFA per year. Remember that the average health care expenditures per capita were 8,911 FCFA in 2008.

2. The invoices submitted by hospitals are not controlled. Only one person is in charge of controlling all hospital invoices. This person is obviously not able to process all these invoices in a timely manner, let alone control them. This is despite the fact that several hospitals include some expenses in their invoices that are ineligible for the Plan Sesame (for example, expenses for child care), as a quick audit found out.

3. Some patients have cheated the system. Retirees covered by the National Pension Fund were supposed to charge the Plan Sesame only for their copayment amount (20 percent of their costs). However, many of them quickly realized that it was easier to pretend not to be covered by FNR, so that they did not have to advance any money. As a consequence, a significant portion of the Plan Sesame debt should in fact be paid by the FNR.

These various problems have led several hospitals to start denying care to elderly people because of a lack of funding from the Plan Sesame. It is also worthwhile noting that almost all actual beneficiaries were from the Dakar area. Some 71 percent of expenditures were undertaken by Dakar hospitals. But only a minority of elderly people reside in Dakar. This suggests that elderly people from rural areas have not benefited much from the Plan Sesame.

Source: authors

3. THE CAUSES OF A FAILED REFORM

The World Bank (see Preker 2003) has developed a framework for analyzing hospital reforms. It aims to measure the consistency between three types of institutional arrangements that are found in every hospital reform:

(i) Accountability Mechanisms (AM), which ensure that hospitals are incentivized to achieve some performance (along the four previously mentioned dimensions: effectiveness, efficiency, equity, and quality). They are the safeguards of the hospital system;

(ii) Decision Space (DS), which is the degree of managerial autonomy granted to hospitals; and

(iii) Management Capacity (MC), which corresponds to the technical capacity (intellectual and physical) of hospitals to adequately use their DS to achieve performance.

In other words, this framework simply assumes that, to achieve performance, hospitals should have incentives (that is, accountability mechanisms), opportunities (decision space) and abilities (management capacity) to do so. As shown by Preker (2003), a hospital reform can only succeed if all the three arrangements are consistent to some degree.

3.1. ADEQUATE ACCOUNTABILITY MECHANISMS (AMS) FOR HOSPITALS WERE NOT IMPLEMENTED AND SOMETIMES NOT EVEN PLANNED

Let us first look at the existing accountability mechanisms in Senegal and how they contribute to the four dimensions of health system performance (as mentioned previously: effectiveness, efficiency, quality, and equity).

3.1.1. Effectiveness

Box 8 - What Are the Various Accountability Mechanisms for Achieving Hospital Effectiveness?

A hospital accountability mechanism (AM) will consist of (i) spelling out clearly the expected objectives to be achieved by a hospital, (ii) measuring regularly the achieved results, and (iii) ensuring the necessary changes are implemented.

As for pursuing hospital effectiveness (that is, having health facilities respond to the population's health needs), there are, in theory, two main types of AMs.

1. Some AM mechanisms are based on government interventions to estimate the population's health needs and to encourage (or sometimes force) hospitals to respond to them. The usual example for this type of mechanism is hospital planning. It can also be supplemented with a hospital board controlled by government representatives.
2. Other mechanisms are based more on a market approach. They assume that health needs and health demand (that is, needs expressed by the population) will be mostly consistent. In this approach, health demand is viewed as an adequate signal to hospitals for deciding which service to provide. This approach requires (i) a risk pooling system for covering most of the population for hospital care and (ii) a hospital payment system where hospitals are paid according to their production (usually a DRG — Diagnosis Related Group system). In addition, the hospital boards will be controlled by representatives of the neighboring community (that is, local politicians or patients).

Note that none of these two types of mechanisms is intrinsically better than the other. The main issue is to ensure consistency. For instance, a frequent problem is when rigid hospital planning is mixed

with case-based payment. These two mechanisms send conflicting messages to hospitals about what they should do.

Source: authors

In principle, according to the 1998 bills, Senegal was planning to implement the first type of accountability mechanism (that is, hospital planning). In reality, this is the second type that was implicitly introduced. As a major part of hospital funding came from direct revenues (that is, user fees), hospitals ended up behaving as quasi-private businesses, but without any comprehensive risk pooling being put in place. The 1998 bills explicitly mentioned the preparation of a hospital master plan, which would guide hospitals in the development and validation of their strategies. But that did not happen. First, a sort of master plan was prepared, but only in 2002, when many hospitals had already developed and implemented their strategies (*projet d'établissement*). Secondly, this master plan was of such poor quality that a new version had to be developed in 2005; however, this new version is still not approved (as of 2012). Finally, mechanisms to ensure consistency between the hospital master plan and hospitals' investment decisions were not put in place.[17] In fact, they were not even considered by the 1998 bills. In this context, the Senegalese hospitals were left free to develop their own strategy, without any real control by the government. This is not — in itself — a bad thing for the sake of effectiveness. The increase in hospital production (as seen earlier) indeed shows that hospitals responded to a significant latent demand. The question is whether this production was responding to merely expressed health demand or to actual health needs. In addition, the damages on equity of access to hospital care are significant.

Another accountability mechanism (AM), implicit in the 1998 bills, was the involvement of regional councils. It seems, this did not work either. Presidents of regional councils were given the chairmanship of hospital boards, while a significant part of the operating subsidy passed through these regional councils (*Fonds Décentralisés de Développement* or FDD). In other words, regional councils were given fairly strong leverage to influence hospital strategies in a way supposedly beneficial to local populations. Apparently, regional councils found little interest in being involved in hospital stewardship. While a few regional councils sometimes withheld the FDD or diverted it for nonhealth purposes, many others simply transferred the FDD to hospitals without asking anything in return (except some recruitments of convenience).

3.1.2. Efficiency

Box 9. What Are the Various Accountability Mechanisms for Achieving Hospital Efficiency?

For fostering hospital efficiency, the range of possible AMs is quite wide. One can cite (i) a hospital payment system based on average unit costs, such as DRGs (yardstick competition), (ii) an annual ranking of hospitals according to their productivity, (iii) a subsidy for rewarding the most productive hospitals, or (iv) a negative residual claimant assigned to hospitals (that is to say, a system where hospitals have a responsibility to cover their own financial deficits).

Source: authors

17. An example for these mechanisms is a process requiring official approval before extending the capacity of a hospital or before creating a new medical department.

As seen earlier, Senegal hospitals are still funded with a mix of government subsidies and user fees. But neither of these two funding streams provides incentives for efficiency. The government operating subsidy is mostly a historical global budget, without much relation to actual production of hospitals. User fees are limited by the maximum rates set in the 2005 decree. And these rates were set less for reflecting average actual costs and more to reduce patients OOP expenses. Furthermore and more importantly, there is no negative residual claimant for hospitals. The current situation — where several hospitals are bankrupt — demonstrates that the government was ready to bail out hospitals, even if bankruptcy was partially the result of hospital management mistakes. In other words, hospitals keep their surplus (and distribute it to their staff) while their deficits are paid by the government. Such an arrangement is not conducive to strong efficiency. Finally, when the negative residual claimant (that is, the one to bail out a bankrupt hospital) is assigned to the government, one could have expected the government to implement mechanisms for controlling hospital expenditures. In theory, this control could have been provided by financial controllers (*controleurs d'Etat*), appointed in each hospital by the Ministry of Finance. Obviously, the presence of these people did not have the expected impact. Similarly, budgetary controls carried out by the MoH are still mostly theoretical, as any hospital is de facto free to start the execution of its budget, whether or not it has been approved by the MoH.

Overall, we cannot identify any significant AM that could have fostered some efficiency in hospitals. It is therefore not surprising that efficiency has collapsed since the hospital reform was implemented.

3.1.3. Quality

Box 10. What Are the Various Accountability Mechanisms for Fostering Quality of Hospital Care?

For quality of care (that is, technical and organizational quality of care), a large number of AMs can be implemented. One can pursue this objective with (i) an accreditation system, with regular inspection of hospitals and possible dissemination of results, (ii) a quality assurance policy, (iii) complaints mechanisms for patients, or (iv) quality-based competition between hospitals.

Source: authors

In Senegal, no mechanism specifically focusing on quality has been set up by the hospital reform. Clearly, the hospital reform, in transferring a significant part of the financing to hospital patients (that is, user fees), has fostered some competition (especially in Dakar, where there is no "hospital monopoly" situation). But patients do not have much information on quality of hospital care. That has greatly reduced competition on quality of care.

Only in 2006 a quality-focused AM was introduced, with the **"performance contract."** This was a contract signed between the MoH and hospitals. Hospitals were assessed on the basis of their progress in some areas related to quality of care (for example, whether staff had been trained on welcoming patients or how prevalent bedsores were), and could accordingly receive an additional grant (between 37 and 75 million FCFA per year). The mechanism was evaluated in 2007 and was eventually phased out, not because of issues in measuring quality, but simply because the MoH could not pay the promised grants.

3.1.4. Equity

At least in theory, equity of access to hospital care is better ensured through demand-side interventions, that is, health financing mechanisms (for instance, health insurance coverage or

free care policies). From this perspective, Senegal has made significant efforts to improve financial access to hospital care through two strategies.

The first one was to **implement free care programs**. The two largest programs are the Plan Sesame (for seniors) and the policy for free birth deliveries (including C-sections). It was noted earlier that these two programs (especially the Plan Sesame) are very underfunded, so that some hospitals are now refusing potential beneficiaries (especially the elderly). In addition, the bills paid under these programs are not controlled, which has generated significant abuse.

The second strategy was to **require hospitals to charge relatively low user fees** (see the 2005 decree), while the government operating subsidy was supposed to offset the revenue shortfall. We have seen that, in the absence of any cost accounting in hospitals, it is difficult to conclude that these rates are clearly undervalued. However, it is possible that this strategy, in capping unit rates, contributed to an increase in quantity. But, in the absence of a risk pooling mechanisms, it would be much more effective (i) to revise the rate structure to fund the variable costs with some realistic[18] lump sum amount and (ii) to allocate to hospitals an earmarked subsidy based on the estimated number of poor (that is, nonpaying) patients. This would avoid the current distortions.

Overall, the AMs mentioned in the 2000 hospital reform were very few, and, in any case, they were not implemented.

3.2. THE DECISION SPACE (DS) IN HOSPITALS HAS INCREASED DISPROPORTIONATELY

Rarely has any country given such a degree of management autonomy to its hospitals. Senegalese hospitals are free to increase or modify (i) their case-mix (no master plan, no licensing of activities), (ii) their workforce and staff compensation (they can hire whomever they want and decide on their salaries and bonuses), and (ii) their investments or purchases of drugs and supplies. Senegal has virtually privatized its hospitals. This is not in itself a negative, if one keeps in mind that privatization must come with serious accountability mechanisms, at least to ensure that public goods are provided. This did not happen.

3.3. MANAGEMENT CAPACITY (MC) IS RELATIVELY ADEQUATE IN HOSPITALS

With the notable exception of financial management, the management capacity of hospitals seems to have been adequately strengthened. Although no evaluation of the provided training is available, it is quite clear that most hospital managers have received intensive training, especially in strategic planning. In contrast, visits to three hospitals raise doubts about the financial management capacity of these teams. As seen earlier, while budgeting and cost accounting aspects seem well understood by hospital management teams, none of the persons met could demonstrate even a minimal knowledge of financial management concepts. For example, they were not familiar with either the concept of cash management plans or of working capital. These weaknesses have contributed to the bankruptcy of hospitals.

Conversely, the capacity of the MoH to monitor and support the hospitals has been very low, despite some progress since 2006. The Directorate of Hospitals (DES), at the Ministry of Health, has long suffered from a high staff turnover, mostly because its staff preferred to

18. That would have to be based on the findings of a cost accounting system.

work in hospitals (where benefits and bonuses are much higher than at the MoH). To avoid this — very predictable — problem, the background reports for the 1998 reform recommended the creation of a specific hospital agency. This proposal was not taken into account in the bill, leading to a situation where the DES has never been in a position to lead and monitor the implementation of the hospital reform. In addition, we have seen earlier that the hospital master plan has not yet been produced. Worse, even if the master plan had been produced, there are no regulatory measures to ensure that hospitals strategic plans will comply with it. Similarly, the DES has no control on hospital investments. For instance, hospitals (and any other health facilities, including private ones) do not have to request a license for their operation or their investments. Today, the DES is mostly a technical adviser, without any leeway for influencing management of hospitals. The performance contracts (launched in 2006 and phased out in 2008) were the only tool available to the DES, to somehow control hospitals (see box below).

Box 11. Performance Contracting Hospital in Senegal: A Failed Attempt

Following the adoption of a national policy on contracting in 2004, the Ministry of Health began to develop performance contracts with hospitals. They were signed during the first half of 2006 with 15 hospitals.[19] These contracts mentioned a set of criteria (see appendix 4) to estimate the performance of hospitals. Most indicators were rated by quality of care. Hospitals with the highest ranking were eligible to receive an additional grant.

The measurement of indicators was conducted in July 2007. Details are listed below:

Hospitals	Score (out of 20)	Eligibility to performance bonus
HOGGY	**17,1**	**YES (bonus * 4)**
THIES	**17,1**	**YES (bonus * 4)**
HEAR	**15**	**YES (bonus * 2)**
THIAROYE	**15**	**YES (bonus * 2)**
DIOURBEL	**13,3**	**YES (bonus)**
FANN	**13,3**	**YES (bonus)**
SAINT LOUIS	**13,3**	**YES (bonus)**
KOLDA	**10,5**	**NO**
NDIOUM	**9,5**	**NO**
LOUGA	**8,6**	**NO**
TAMBACOUNDA	**7,6**	**NO**
ZIGUINCHOR	**6,7**	**NO**
LE DANTEC	**5,7**	**NO**
OURO SOGUI	**5,7**	**NO**
KAOLACK	**4,8**	**NO**

Source: Ministry of Health, August 2007.

In the beginning, the approach was well received. No hospital (including those with low rankings) has challenged the criteria and evaluation arrangements. Note also that the amounts awarded were not negligible, accounting for a bonus of approximately 10 percent of the annual operating subsidy. Unfortunately, the promised amounts were never paid by the MoH. The contracts were not renewed.

Source: authors

19. The biggest ones (Le Dantec and Principal) were not included.

4. A WAY FORWARD

4.1. INTRODUCING A REAL STEWARDSHIP FOR THE HOSPITAL SECTOR

- **Replacing the DES by a National Hospital Agency (ANH).**
  This agency would be jointly managed by the MoH and the Ministry of Finance. The agency should:
  - Have its own staff, with an adequate compensation package so that the ANH can "compete" with hospitals to attract and retain the most qualified staff.
  - Have the regulatory powers to effectively manage the hospital sector. More precisely, the ANH would be the sole authority to (i) approve the creation and extensions of hospital activities, (ii) allocate annual operating subsidies, (iii) approve draft hospital budgets (including planned recruitments and compensation policies), and (iv) approve strategic plans.
- **Implementing new performance contracts with hospitals.**
  Five-year plans have been proposed between the ANH and each hospital. These contracts would define the contributions and objectives of each party. In particular, the contracts would determine the amount of operating and investment subsidies granted to a hospital as well as the activities for which it is authorized. In turn, a hospital would become accountable on a set of financial and health indicators.

4.2. IMPROVING EFFECTIVENESS OF THE HOSPITAL SYSTEM

- **Developing comprehensive regional health master plans and clearly defining their legal superiority on hospital projects.** By "comprehensive regional health master plans," we mean master plans that will define the needs of each region of Senegal in terms of health care facilities or services and in terms of number and skill-mix of health workers, according to the epidemiological profile of these regions rather than the national (and very vague) standards. These master plans will cover all health facilities, regardless of their level (for example, hospitals, health centers) and their legal status (public, private nonprofit, private-for-profit). With these features, regional master plans could be used to achieve some consistency between supply and demand of health care services. One of the tools for implementing these master plans would be a regulatory arrangement to ensure no hospital strategic plan (that is, including planned investments) can be implemented without MoH's approval, an approval that would be granted only after verification of the plan's consistency with the regional master plan.
- **Establishing a formal procedure for evaluating hospital managers, with a performance-based financial incentive.** We have seen that managers are largely autonomous. Although they are nominally accountable to the ministry and to hospital boards, no procedure exists for setting concrete objectives to evaluate performance. This has to be set up, along with a performance-based financial incentive.
- **Creating a mechanism for "receivership" of bankrupt hospitals,** with appointment of a receiver (replacing the director and the board). In addition to the previously mentioned measure, a mechanism could be established for receivership of bankrupt hospitals. This would seriously limit opportunistic behaviors of hospital managers or boards of directors who consider themselves exempt from good management practices, given that their deficits would be ultimately funded by the government. Such a measure would indeed reduce the effects of the aforementioned negative residual claimant held by the government.

4.3. RESTORING SOME DEGREE OF EFFICIENCY IN HOSPITALS

- **Training (or retraining) hospital management teams in financial management (especially cash management).** Capacity is indeed very low in this area, which may explain the difficulty hospitals have in anticipating their cash flow problems.
- **Setting up a fund for staff severance packages to help reduce the hospital workforce.** Given the current financial situation of Dakar hospitals, it is clear that downsizing unskilled workers cannot be done at the rate of retirements. Massive layoffs are inevitable and must be accompanied by government financial support (through funding of early retirement or substantial severance packages).
- **Requiring hospitals to prepare a "workforce table"[20] (*tableau des emplois*), with a corresponding budget (updated quarterly).** To control the wage bill, it is essential that hospitals have a roster of all the different funded positions (whether they are filled or not). Recruitments will then be made within the limit of this workforce table. In practice, this implies that no recruitment (or assignment) can be made in excess of the workforce table. In addition, it is preferable that only the board is empowered to amend the workforce table (to be approved by the government).
- **Implementing the special status for health workers or at least rationalizing the staff bonuses system.** We have previously seen the great complexity and the low coherence of the bonus system. This system is not only financially unsustainable, but it also yields little incentive for performance. In addition, a major problem is that agents with the same qualifications working in the same institution have different statuses. The implementation of the special status would solve this problem, while providing an opportunity to review the bonus system. Finally, within hospitals, no new bonus should be created unless its financial impact has been estimated beforehand. The government should control the creation or modification of bonuses.
- **Reviewing the rate structure for hospital user fees,** on the basis of the findings of a cost accounting system and reflecting the actual variable costs. In theory, hospital rates are an accountability mechanism that can effectively aim at only one goal: efficiency. Therefore, they should in Senegal, as elsewhere, be defined in terms of actual variable unit costs of hospital services. This would require inefficient hospitals to streamline their costs to remain profitable. Hospital efficiency is inevitably lowered when rates are based on other considerations, such as equity (that is, low rates). It is therefore imperative to review the rate structure of hospital user fees on the basis of the findings of a national cost accounting exercise. Such a system has already been designed by the MoH. It needs only to be rolled out in every hospital.
- **Allocating the government operating subsidies according to the actual production of hospitals, to limit rent situations.** Again, the logic of efficiency requires allocating a grant from the government on the basis of actual (or estimated) production activity and not on the basis of historical data or discretionary decisions. The criteria for allocating these grants must and can be kept simple. There is no particular need to develop a complicated tool such as a DRG (Diagnosis Related Group) system, which is extremely expensive to implement (and even harder to maintain) and has questionable relevance when hospitals have a simple case-mix.[21]

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20. This is usually called the "establishment" in Anglophone countries.

21. However, coding all hospital stays with an international classification system (ICM–10) would be very useful, but more for epidemiological than for efficiency reasons.

- **Restructuring the hospital system in Dakar,** in merging some existing hospitals and establishing centers of excellence by specialty or by group of specialties (for example, a neurocardio center, a mother-child center, and so forth). We have seen that the Dakar hospitals are the least efficient. Beyond the problems of overstaffing, it is clear that these institutions are also often oversized and are staffed with low-skilled workers. It would be wise to explore the possibility of restructuring all Dakar hospitals, to merge several of them and turn them into centers of excellence (with a maximum of 200 to 300 beds each).
- **Fostering a participatory culture in the management of hospitals.** Some hospitals (for example, Abass N'Dao, Diourbel) have started to involve doctors and staff unions in their financial management. To do so, they not only use the newly created representative bodies (that is, Hospital Medical Commission [CME] for doctors and Hospital Nonmedical Commission [CTE] for other staff), but they have also developed accurate reporting, implemented a transparent and regular dialogue on their financial situation, and set up a financial decentralization by medical departments. In practice, when staff are well aware of the link between production, revenues, and staff bonuses, it becomes much easier to improve the production of a hospital and consequently its financial position. These entrepreneurial initiatives should be replicated, particularly through an evaluation and training of hospital decision makers (not just managers).

4.4. ENHANCING QUALITY OF HOSPITAL CARE

- **Establish quality assurance mechanisms** (for example, procedure for allowing patient complaints, annual patient satisfaction survey, collection and analysis of data on the origin of patients). These are simple and inexpensive mechanisms to implement. They could trigger true emulation among hospitals (as seen already with the old version performance contracts) and could help improve organizational quality and responsiveness.
- **Earmarking a part of the annual operating subsidies to fund regular supervision of health centers by hospitals.** We have seen that hospitals are poorly integrated with health centers. It is not the norm for health centers in a region to refer the majority of their patients to the regional hospital. It is equally unusual for health centers to compete with regional hospitals in activities such as surgery and lab tests. A first step toward better integration would be to organize supportive supervision of health centers by hospital clinicians. This could be funded by earmarking for supervision as a part of the annual operating subsidy.

4.5 MAKING ACCESS TO HOSPITAL CARE MORE EQUITABLE

- **Earmarking a part of the operating subsidy for funding poor patients.** Although better management of social cases may involve the introduction of demand-side interventions (health insurance scheme, free care), a quick solution would be to condition the payment of a portion of the government subsidy to the care of a minimum number of social cases. The preconditions for this measure would be (i) the existence of a cost accounting system and (ii) a better knowledge of the health care needs of the poorest. Strict control of the implementation of this measure should be implemented to avoid "false social cases."
- **Provide adequate funding to the Plan Sesame.** We have seen that the underfunding of the Plan Sesame has generated huge debt among hospitals, especially in Dakar.

Additional funding is obviously needed for the Plan Sesame. Conversely, invoices submitted by hospitals should be rigorously controlled.

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Appendix A. An Overview of the Various Financial Bonuses for Hospital Staff in Senegal

Through discussions with several hospital managers and union leaders, we have attempted to carry out an inventory of different bonuses for hospital staff in Senegal. One can see that (i) the range of bonuses is very broad and somewhat confusing, (ii) many of the bonuses paid by hospitals to their contract-based staff are a response to the creation of similar incentives by the government for its civil servants (who can be posted in hospitals).

*Table **A1**. List of Staff Bonuses in Hospitals*

	Funder	**Beneficiaries**	**Amount (in FCFA)**	**Comments**
Bonus for liability	Government	Doctors (only civil servants)	180K / month	Since 2006
Bonus for liability	Hospitals	Doctors (only contract-based staff paid by hospitals)	Variable.	Some institutions add an enhanced bonus (e.g., 110K at St. Louis Hospital)
Bonus for qualification	Hospitals	Doctors who are not department heads	St. Louis Hospital: 100K / month in 2007	
Bonus for department head	Hospitals	Doctors who are department heads	70K / month	St. Louis, Le Dantec
Hardship allowance	Government	Medical and paramedical staff (civil servants)	25K / month	Increased in October 2004 and in October 2005
Hardship allowance	Hospitals	Medical and paramedical staff (contract-based)?	15K / month in St. Louis and Thies	
Risk bonus	Government	All staff (civil servants)	50K / month	Increased in October 2004 and in October 2005
Risk bonus	Hospitals	All staff (contract-based)	25K / month in St. Louis or 30K in Thies	
Motivation bonus	Government	All staff (civil servants)	50K / month	Since 2001
Profit-sharing bonus	Hospitals	All staff (civil servants and contract-based staff)	Variable: on average, between 22K and 44K / month	25% of hospital user fees at Le Dantec, 20% at Hoggy
Transportation bonus	Government	All staff (civil servants)	16.5K / month	
Transportation bonus	Hospitals	All staff (contract-based staff)	13K / month (Le Dantec)	
Housing allowance	Hospitals	Doctors who do not receive a house	St. Louis: 70K/month	

Source: World Bank
Note: 1 USD ≈ 500 FCFA.

Appendix B. Is There a Shortage of Nurses in Senegalese Hospitals?

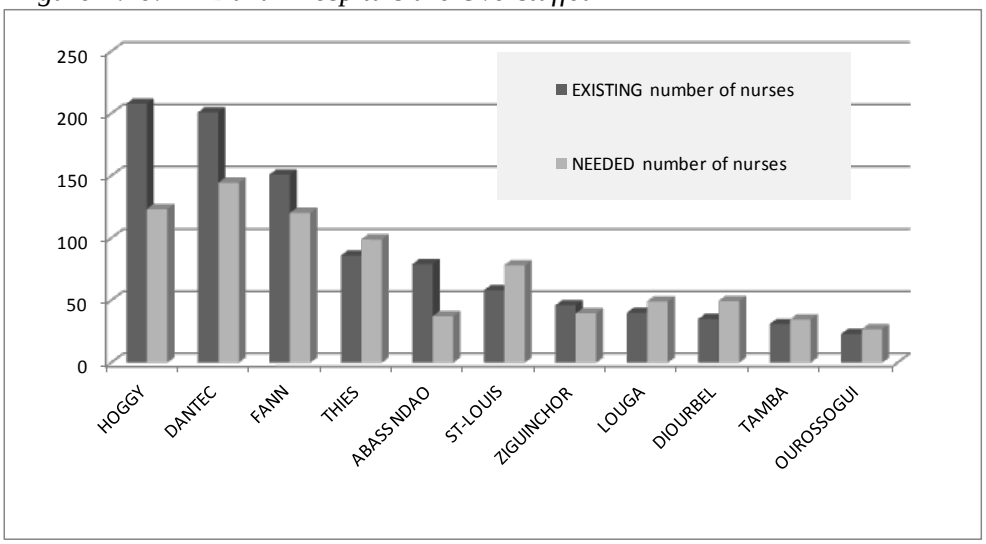
To answer this question, we estimated the need for nurses by calculating the ratio of the number of present patients over the number of nurses. This methodology is recommended by WHO (Shipp 1998) and the International Council of Nurses (2004). Similar approaches are also widely used in hospitals in developed countries.
We made four key assumptions:

1. **We chose an average ratio of one nurse for six patients present, which is rather a generous ratio.** This ratio is equal to the one in Californian and Australian hospitals. It is much more ambitious than that usually found in Sub-Saharan Africa (for example, Tanzania and Uganda use ratios of one nurse for ten patients). This ratio applies only to medical services or general surgery. It obviously underestimates the staffing needs of intensive care units (and in general all units where patients are unconscious). We have not made this correction because the precise structure of hospital services in Senegal was not known. However, this underestimation is largely offset by an overestimating factor due to the fact that the ratio of one to six usually applies only to day shifts and should be reduced for night shifts (typically to one nurse for eight patients). In total, we estimate that the ratio of one to six is a good estimate of staffing needs.
2. **We also assumed that all inpatient services operated 24 hours a day.** This assumption is, again, quite generous (that is, it overestimates the staffing requirements), given that few hospitals in Senegal actually operate 24 hours a day.
3. **We estimated that having a nurse on duty 24 hours a day required the recruitment of about four nurses,** that is, (i) one for each of the three shifts and (ii) one for rest or vacations (see recommendations in Shipp 1998, 72).
4. **We considered that, in Senegal, the term "nurse" included midwives, registered nurses, enrolled nurses, and nursing technicians.**

While most of these assumptions lead to overestimates of nurses' requirements, it must be noted that they apply only to inpatient care. So, the main limitation of this analysis is that it does not take into account outpatient care.

Based on these assumptions, the results of our analysis (using 2006 data of 11 hospitals) are the following:

*Figure B.**20**. All Dakar Hospitals are Overstaffed*



Source. 2006 data from hospitals, and analysis by WB.

For example, in Abass N'Dao (the least efficient hospital according to our DEA), the need for nurses is estimated at 37, while the current workforce is 79.

In total, unsurprisingly, all Dakar hospitals appear largely overstaffed, while several regional hospitals are understaffed.

Appendix C. Are Senegalese Hospitals Efficient?

To answer this question, we used a Data Envelopment Analysis (DEA).

1. Why use a Data Envelopment Analysis (DEA)?

Data Envelopment Analysis is much more powerful than other methods (that is, Productivity Ratio Analysis or Stochastic Frontier Analysis [SFA]), for at least four reasons:

- Hospitals are multiproduct entities. Clearly, they produce hospital stays, but also outpatient visits, surgical procedures, imaging, and laboratory tests. A ratio analysis therefore requires defining a weighing rule to aggregate these outputs into a single output, (which will be used as the numerator of productivity ratios). For instance, one can assume that one hospital stay is equivalent to five outpatient visits. With DEA, such a simplistic and questionable assumption is unnecessary. A DEA will indeed generate its own weights, based on the hospitals considered by the DEA algorithm as the most efficient within the sample.
- In the analysis of technical efficiency of hospitals, only a DEA permits the determination of "pure technical inefficiency" due to scale effects (that is, hospitals too small or too large).
- There are benchmarks for hospital efficiency in Africa. All were defined according to a DEA.
- A DEA does not require a large sample because it is a method based on linear programming and thus not statistical.

2. Which inputs and outputs at hospitals have been selected?

Before presenting the inputs and outputs that have been selected for our DEA, it is worth mentioning what is called the Cooper Rule (Cooper 2006), which recommends that the number of observations (that is, hospitals) shall not be less than the following:

*Max {# input * # outputs, (# inputs + outputs #) * 3}*

In this case, the DEA was performed with only 16 observations (out of a possible 20). After several tests, we concluded that, to comply with the Cooper Rule[22] while having a meaningful analysis, the inputs and outputs should be the following:

	Outputs	Inputs
Parameters used in the DEA analysis	1. Hospital stays 2. Outpatient visits	1. Number of doctors 2. Number of paramedical staff 3. Number of other staff

As for outputs, we have not included the number of surgical procedures, despite the fact that this output plays an important role in explaining hospital efficiency. Two reasons led us to eliminate this output:

22. When this rule is not met (too many inputs and outputs or not enough observations), the DEA algorithms have difficulty differentiating between entities, leading to a large number of entities (that is, hospitals) that are considered efficient (efficiency index at 100 percent). Ideally, only two entities should be considered as fully efficient.

- First, the MoH could not provide the number of surgical procedures per hospital in 2006; (which again illustrates the weakness of the MoH information system).
- Secondly, with the low number of observations (16), including a third output would lead to a violation of the Cooper Rule.

As for inputs, we have not included the number of beds. Yet it is a good indicator of capital intensity in a hospital (see Wagstaff 1992). But, again, adding a fourth output would have violated the Cooper Rule.

3. What are the data and parameters used?

We used the DEAP software (accessible at www.uq.edu.au/economics/cepa/deap.htm).
The parameters of the DEAP algorithm were the following:

16	Number of firms
1	Number of time periods
2	Number of outputs
3	Number of inputs
1	0=Input and 1=Output orientated
1	0=CRS and 1=VRS
0	0=DEA (Multistage), 1=COST-DEA, 2=MALMQUIST-DEA, 3=DEA (1-Stage), 4=DEA (2-Stage)

The algorithm chosen is output-orientated (not input-orientated) because we assume that hospitals can more easily change their outputs (including case-mix) than their inputs. It is indeed very difficult for hospital managers to downsize their workforce (the essential input), both regarding civil servants (their status guarantees them job security) and contract-based staff (pressures from unions and politicians is too high).

Table 2 - Data entered into DEAP (2006 data).

		Outputs		Inputs		
		Outpatient visits	Hospital stays	Doctors	Paramedics	Other staff
1	Abass N'Dao	18161	5356	33	211	197
2	Fann	51413	2612	53	291	198
3	Hald	84167	24138	207	315	404
4	Hear	33194	3670	37	79	105
5	Hoggy	117532	10619	59	370	311
6	Diourbel	46012	5970	15	27	146
7	Kaolack	55882	8696	24	124	125
8	Kolda	22573	12734	9	91	52
9	Louga	52432	6981	17	69	121
10	Ndioum	11347	2502	5	38	37
11	Ourossogi	21770	2715	11	44	65
12	Principal	106892	15979	72	432	540
13	Saint-Louis	52209	10923	23	159	305
14	Tamba	5460	4345	15	74	100
15	Thies	84235	13893	37	162.	224
16	Ziguinchor	19186	5696	11	92	58

Source: World Bank database

4. What are the results of the analysis?

They are listed below:

Table 3 – Results of the DEA analysis (DEAP software)

	Hospital	Efficiency index CRS	Efficiency index VRS	Scale effect	
1	Abass N'Dao	.0212	.0382	.0553	DRS
2	Fann	.0581	.0642	.0905	DRS
3	Hald	.0544	1.000	.0544	DRS
4	Hear	.0720	.0727	.0990	IRS
5	Hoggy	.0847	1.000	.0847	DRS
6	Diourbel	1.000	1.000	1.000	
7	Kaolack	1.000	1.000	1.000	
8	Kolda	1.000	1.000	1.000	
9	Louga	1.000	1.000	1.000	
10	Ndioum	.0770	1.000	.0770	IRS
11	Ourossogui	.0767	.0928	.0826	IRS
12	Principal	.0486	1.000	.0486	DRS
13	Saint-Louis	.0766	.0925	.0828	DRS
14	Tamba	.0384	.0397	.0966	DRS
15	Thies	.0863	1.000	.0863	DRS
16	Ziguinchor	.0748	.0760	.0984	IRS
	Average	*.0730*	*.0860*	*.0848*	

Note: IRS = increasing returns to scale; DRS = decreasing returns to scale; CRS = constant returns to scale; and VRS = variable returns to scale.

Source: DEAP software

As can be observed, with 4 of the 16 hospitals considered as fully efficient, the analysis is not of a very high quality. This is easily explained by the small sample (16 observations). It is therefore very likely that the analysis overestimates the technical efficiency of hospitals.

As a precaution, we have chosen the CRS[23] index or 73 percent. This corresponds to the average technical efficiency of 16 hospitals. In practice, this means that **27 percent of inputs (that is, human resources) is wasted and could be reduced without any impact on the total production capacity of hospitals.**

23. Constant Returns to Scale.

Appendix D. Content of the Hospital Performance Contracts

Table 4 – Criteria for the hospital performance contracts

Categories	Criteria	Indicators
Quality assurance	Completion in 2008 of at least one quality-enhancing project, with one (or more) procedure(s) written, approved, implemented, and evaluated	Existence of a quality-enhancing project implemented and evaluated
Responsiveness	Evaluation of the performance of the department or the reception	Existence of an evaluation report
	Carry out at least a satisfaction survey of users during the year 2008	Survey conducted and results analyzed
Hygiene and hospital-based infections	Existence of an action plan for the CLIN[24] (i) validated by the CME[25] and the hospital management team, (ii) approved by the board, and (iii) including a program for surveillance of hospital-based infections (monthly measure of incidence of hospital-based infections in the at-risk departments, prevalence survey) and a program for staff training	Existence of a validated and approved action plan
	Quarterly meetings of the CLIN	Existence of meeting minutes
	Existence of an annual report of activities of the CLIN	Annual report available
	Establishment of a protocol selected from the priority themes identified by the MoH	Existence of a written, validated, and implemented protocol
Quality of care	Evaluation of two treatment protocols for the management of two conditions among the ten most common in the hospital	Existence of evaluation reports
Accommodation quality	Introduction of tracking tools for utilization of sheets; Regular checks of sheet allocations	Existence of a monthly record; Existence of a quarterly record of on-site audit of allocations in the linen services

Source: Ministry of Health. 2007.

24. Comite de Lutte contre les Infections Nosocomiales (Internal working group in charge of monitoring and preventing hospital-based infections).
25. Commission Medicale d'Etablissement (Body representing all the doctors in a given hospital).

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