ANALYZING THE TECHNICAL EFFICIENCY OF PUBLIC HOSPITALS IN NAMIBIA

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It was prepared by Claire Jones and Tesfaye Ashagari for the Health Finance and Governance Project.

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Abt Associates Inc. | 6130 Executive Boulevard | Rockville, Maryland 20852
T: 301.347.5000 | F: 301.652.3916 | www.abtassociates.com

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ANALYZING THE TECHNICAL EFFICIENCY OF PUBLIC HOSPITALS IN NAMIBIA

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ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
DEA	Data Envelopment Analysis
DRS	Decreasing Returns to Scale
GRN	Government of the Republic of Namibia
HFG	Health Finance & Governance Project
HIV	Human Immunodeficiency Virus
IRS	Increasing Returns to Scale
MoHSS	Namibia Ministry of Health and Social Services
UHC	Universal Health Coverage
VRS	Variable Returns to Scale

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EXECUTIVE SUMMARY

The achievement of universal health coverage (UHC) and the identification of sustainable health financing options for the provision of health services are the key priorities of the Government of the Republic of Namibia (GRN). In the context of the economic downturn in Namibia and the trend of decreasing donor resources as a result of Namibia's classification as an upper-middle-income country, the reprioritization and efficient use of resources to create fiscal space in the Namibia Ministry of Health and Social Services (MoHSS) budget have become critical measures to facilitate the continued provision of priority health interventions, including Human Immunodeficiency Virus (HIV) programs and services, without jeopardizing long-term sustainability. Since hospitals consume a significant portion of Namibia's total health budget, with 59 percent of public health expenditures being spent at government hospitals alone (2016/17), hospitals are central to achieving improved efficiencies in the public health sector. The objective of this activity was to identify ways of expanding Namibia's fiscal space for health and HIV through technical efficiency gains at district hospitals in the country.

The study collected cost and output data for the financial year 2014/15 from all of the 29 district hospitals and 5 referral hospitals. Data Envelopment Analysis (DEA) was used to calculate hospital efficiency scores and benchmark the hospitals relative to the group's observed best practice. The DEA was performed using an "input orientation," since the district and referral hospitals in Namibia have limited control over the outputs they produce. The analyses therefore show how savings can be achieved by using the inputs more efficiently (i.e., fewer inputs) to generate the same outputs. In order to assess the scale efficiency of the hospitals, an assumption of VRS was used in the analyses since the district and referral hospitals included in the study are not considered to be operating at an optimum scale. Interviews were conducted with key staff of selected hospitals to complement the quantitative data collected.

Fifty-two percent of the hospitals included in this study were found to be technically inefficient, which means that they could improve their operations in order to be more efficient. The mean technical efficiency score for these inefficient hospitals was 81 percent, which means that overall efficiency savings of 19 percent on inputs could be realized without affecting the output levels.

In terms of scale efficiency, the vast majority of hospitals had a scale efficiency score of less than 100 percent, with a mean scale efficiency score of 71 percent. This implies that the input–output mix in these hospitals is inefficient. Most of the scale-inefficient hospitals showed increasing returns to scale (IRS), which means that the hospitals' outputs should be increased to reduce the unit costs. Since the outputs are driven by the demand for healthcare services and are mostly out of the control of the hospitals, the size of the hospitals should be reduced to improve the scale efficiency. The scale efficiencies differ between district and referral hospitals and can be improved by strengthening the referral system.

The most significant efficiency savings can be achieved through improved redistribution of clinical staff and allocation of non-salary-recurrent expenditure budgets. Assuming that all facilities would address these inefficiencies, the total savings for the relevant hospitals would amount to 32 percent in clinical staff costs, 5 percent in nonclinical staff costs, 46 percent in recurrent expenditures, and 14 percent in the number of beds.

In the short term, there are two critical considerations for the ministry—the reallocation of clinical staff and the introduction of an appropriate resource allocation formula that would allow for resources to be allocated to regions and their respective health facilities and hospitals according to the health needs and utilization of health services.

1. INTRODUCTION

1.1 Background of the Study

The achievement of UHC and the identification of sustainable health financing options for the provision of health services are the key priorities of the GRN. The country is currently experiencing an economic downturn, which has resulted in significant budget cuts for the government as well as decreased resources for health. Furthermore, the country continues to be relatively reliant on donor funding, particularly for its HIV interventions, to which donors contributed 47 percent of total HIV expenditures in 2014/15. Donor support to Namibia has been decreasing in recent years, from 22 percent of total health expenditures in 2008/09 to 6 percent of total health expenditures in 2014/15, and this trend is expected to continue due to Namibia's status as an upper-middle-income country. In order to achieve UHC, there is significant pressure on the government for a health system that allows for improved access to quality service within the existing resource constraints. This increasing need for equity of access to healthcare necessitates efficient allocation and proper management of scarce resources, which can only be done effectively with a comprehensive understanding of the efficiency of service provision.

Reprioritization and efficiency have the potential to create fiscal space in the MoHSS budget and allow the provision of resources to health priorities, including HIV programs and services, without jeopardizing the MoHSS long-term sustainability. Hospitals consume a significant portion of Namibia's total health budget, with a sizeable portion—more than 63 percent of public health expenditures—being spent at government hospitals alone (2014/15). Since hospitals have such a central role in providing care and treatment and consume such a significant portion of public health expenditures, they are a key area where the MoHSS can achieve improvements in efficiency.

With the trend of decreasing donor resources in the country and the impact of the economic situation on the resources for health, there is increasing pressure on the GRN to identify sustainable means of financing the health and HIV/Acquired Immunodeficiency Syndrome (HIV/AIDS) multisectoral response to maintain the significant gains achieved by the country. If the GRN is able to expand the country's fiscal space for health by streamlining hospital operations to gain better value for money, there is potential to improve not only hospital operations and efficiency but to strengthen the larger health system as well.

This study on the efficiency of hospital-based health services in Namibia aims to provide the necessary information and analyses that would allow the GRN to make informed decisions regarding required improvements to increase the efficient use of resources and therefore the potential expansion of Namibia's fiscal space.

1.2 Objectives of the Study

The objective of this activity was to identify ways of expanding Namibia's fiscal space for health and HIV through technical efficiency gains at district hospitals in Namibia. This study builds off the Health Finance & Governance project (HFG's) health facility unit costing study in Namibia and a study published in 2006 that assessed technical efficiency of public sector hospitals in Namibia over four financial years (1997/98 to 2000/01) (Zere, 2006).

To this end, HFG investigated the cost drivers, productivity, and efficient use of resources (human, infrastructure, capital, consumable, pharmaceutical, and financial) in the production of HIV and other hospital services through the collection of data from the facility level. The study further aimed to generate new knowledge by identifying relevant factors that cause variations in technical efficiency.

2. METHODOLOGY

This section describes the approach that was followed for the implementation of the study and the scope of the research activities.

2.1 Research Parameters

Cost and output data on the financial year 2014/15 was collected from all of the 29 district hospitals and 5 referral hospitals. The type of data that were collected through the quantitative questionnaires included the following:

- Number of outpatient services by outpatient department
- Number of beds, inpatient admissions, bed days, and occupancy rate by inpatient department
- Number and type of health services provided for priority diseases including HIV/AIDS, tuberculosis, and malaria
- Breakdown of salary expenditure
- Staff composition, average working hours/days, salary grades, and funding by government
- Revenue collected from patients and other sources
- Operational expenditures broken down by expenditure type paid from the government budget
- Operational expenditures paid from outside resources
- Total expenditure on pharmaceuticals and clinical supplies
- Total expenditure on x-rays, ultrasound, CT scans, and digital imaging
- Number of x-rays, ultrasound examinations, CT scans, and digital imaging tests performed
- Facility infrastructure in terms of vehicles, computers, and total value of inventory

Additional information was collected at the national level on the expenditures on and number of laboratory tests performed through the Namibia Institute of Pathology as well as some salary and output data that were not available at certain facilities. Furthermore, data on selected indicators were extracted from the Health Management and Information System to be used as a proxy of the quality of health services to determine to what extent increased efficiency compromises the achievement of improved health outcomes.

Information on hospital expenditures was analyzed in relation to the outputs achieved by the hospitals, such as the annual number of admissions, bed occupancy rates, and number of outpatient services provided. Ratios of costs per output were computed and used for the analyses in order to take into account the scale of the facilities. Key performance indicators were developed to compare the relative performance of the facilities in terms of efficiency. To facilitate the analyses and comparisons of hospitals' relative performance, a DEA was conducted to calculate hospital efficiency scores and benchmark the hospitals relative to the group's observed best practice. The DEA model assisted the team to find answers to questions such as (Zere, 2006):

- Which district hospitals are the most efficient?
- If all district hospitals are to perform according to best practice (i.e., the efficient peer hospitals), by how much could inputs/resources be reduced to produce the current output levels; or alternately, by how much could outputs be increased with the current input levels?
- Which of the efficient district hospitals can serve as role models to the inefficient ones?

The level of efficiency was used to estimate the amount of resources representing potential savings. These efficiency gains were used as the bases to estimate reductions in the financing gap for health and priority HIV services. HFG further developed recommendations to improve the efficiency of hospital services. This information aims to inform operations management decisions on improving productivity without compromising quality.

2.2 Data Collection

2.2.1 Quantitative Data

The majority of the data collected as part of this study was quantitative. The data were collected by means of a questionnaire, which was distributed electronically to the identified hospitals. During the initial phase of data collection, remote support for completion of the questionnaires was provided to the hospitals by the HFG project staff, either telephonically or via email. The HFG data collection team worked in collaboration with the MoHSS for the collection of data from the public hospitals.

After the deadline for the return of completed questionnaires, outstanding data were followed up by email and telephone. Where data gaps were relatively small, this approach was continued until most of the significant data were obtained. For the facilities that did not submit any data at all and those that had significant data gaps, the HFG team conducted data collection visits to these selected facilities. A total of 16 hospitals were covered as part of these data collection visits.

2.2.2 Qualitative Data

Qualitative data were also collected from the hospitals that were visited for data collection through interviews with key facility staff such as the chief medical officer or head nurse. The aim of the qualitative data collection is to gain better understanding of the operational challenges that the hospitals are facing, which may lead to inefficiencies. In these questionnaires, the respondents were asked to rate certain hospital functions in terms of their efficiency, while also asking more general questions about the drivers of inefficiencies. The qualitative questionnaires were administered in 15 of the hospitals included in the study.

2.3 Data Cleaning and Analysis

After the completion of data collection from the facilities, HFG rigorously reviewed the data set for completeness and consistency before consolidating it into a combined Excel spreadsheet. HFG identified numerous data gaps where the information was not available at the health facility level or where the data were not available at the time of collection. HFG performed data follow-up either by contacting the facility directly or requesting the outstanding information through the MoHSS national and regional levels. HFG followed up these requests for outstanding information on a regular basis until a specified cut-off point.

DEA was used to analyze the results of this study. It is a frontier methodology that is commonly used for measuring efficiency of healthcare organizations. DEA is a non-parametric mathematical programming approach to frontier estimation that is highly flexible and suitable for measuring the efficiency of hospitals using multiple inputs to produce multiple outputs.

The aim of this study is to analyze the technical efficiency of the district- and referral-level public hospitals. A health facility is considered to be technically efficient if is it able to produce the maximum level of outputs given a set of inputs. The technical efficiency scores were computed using the DEA program by Tim Coelli (WINDEAP version 2.1.0.1) (Coeli, 1996). The DEA was performed using an "input orientation," since the district and referral hospitals in Namibia have limited control over the outputs that they produce. The analyses will therefore show how savings can be achieved by using the inputs more efficiently (i.e., fewer inputs) to generate the same outputs. In order to assess the scale efficiency of the hospitals, an assumption of VRS was used in the analyses, since the district and referral hospitals included in the study are not considered to be operating at an optimum scale. Results of decreasing returns to scale (DRS) indicate that the hospitals are very large for their volume of operations, while IRS indicate that the hospitals are very small for their volume of operations.

The input variables included in the analyses of this study comprised the number of clinical staff, number of nonclinical staff, total recurrent expenditure of the hospital (including recurrent expenditures and pharmaceuticals and clinical supplies, but excluding expenditures on human resources), and the number of beds (as proxy of the capital infrastructure). The output variables included the total number of outpatient visits (including general outpatient visits and outpatient visits to specialist departments) and the total number of inpatient admissions.

Grootfontein, Nankudu, and Usakos hospitals were removed from the analyses due to incomplete expenditure information, which would significantly bias the results in terms of the efficiency ratings achieved by the facilities.

Descriptive statistics were calculated for all input and output variables for the remaining facilities. The results of the analyses are illustrated in Table 1. A correlation analysis was performed on the output variables to confirm that none of the output variables is associated. The correlation coefficients of 0.87 indicate that the selected variables are related.

Table 1: Descriptive statistics of input and output variables

Variable	Type	Mean	Standard deviation	Minimum value	Maximum value
Number of clinical staff	Input	160	183	25	843
Number of nonclinical staff	Input	142	130	36	481
Total recurrent expenditure (excl. HR)	Input	NAD$38,922,451	NAD$50,541,920	NAD$7,604,178	NAD$236,034,505
Number of beds	Input	233	272	43	1386
Number of OPD visits	Output	105,530	103,143	11,786	498,110
Number of IPD days	Output	58,464	95,290	6118	474312

The robustness of the results was tested using Jack-knifing analysis to assess the existence of any outlier hospitals (Effron,1982). For this analysis, the efficient hospitals were removed from the analysis model one at a time, and the technical efficiency scores were recalculated. The efficiency scores of these resulting models were then compared to the efficiency scores of the original model that includes all of the hospitals by means of the Spearman rank correlation coefficients. A Spearman rank correlation coefficient value of 1 indicates that the rankings are exactly the same, while a coefficient of 0 indicates no correlation between the efficiency scores. The mean Spearman rank correlation coefficient of the model was 0.979 (ranging from 0.856 to 1), which indicates that there is no significant influence of outliers on the efficiency frontier of the model.

2.4 Definitions of Different Efficiency Types

The analyses included in this study used measures of both technical efficiency and scale efficiency. Under the DEA methodology, technical efficiency measures how many inputs are required to produce a certain level of outputs—in other words, how efficient the hospital is in generating outputs with the inputs it is provided. The most efficient hospitals in the data set are said to be on the efficiency frontier, which is the highest level of efficiency attainable equal to an efficiency score of 100 percent. Any efficiency score below 100 percent indicates that the hospital is less efficient.

Hospitals can also be technically inefficient as a result of inappropriate hospital size. This is referred to as scale inefficiency. A hospital is said to be scale efficient when it operates under constant returns to scale and its size of operations is optimal so that any modifications on its size will render the unit less efficient. Scale inefficiency can either be in the form of decreasing returns to scale or increasing returns to scale. Decreasing returns to scale imply that a hospital is too large for the volume of activities it conducts, meaning that unit costs increase as outputs increase. Increasing returns to scale imply that the hospital is too small for its scale of operations and that unit costs decrease as its outputs increase.

2.5 Data Limitations

The study could not include Grootfontein, Nankudu, and Usakos hospitals due to incomplete data.

3. ANALYSIS OF THE EFFICIENCY RESULTS

3.1 Results of the Data Envelopment Analysis

Using the VRS DEA model, an average technical efficiency score of 90.6 percent was achieved, which indicates that overall, the hospitals have been operating at a relatively high level of efficiency. The technical efficiency scores range from 0 percent to 100 percent, with 0 percent indicating that a facility is extremely inefficient, while a facility with a score of 100 percent would be very efficient and classified as a benchmark against which the efficiencies of the remaining hospitals is measured. Of the 31 hospitals included in the final dataset, 16 were to be efficient by achieving a technical efficiency score of 100 percent. The remaining hospitals had a mean technical efficiency score of 81 percent, with the least efficient hospital having an efficiency score of 57 percent. This means that the technically inefficient hospitals could improve their efficiency to realize savings of 19 percent on inputs without affecting the output levels (Table 2).

Table 2: Technical and scale efficiency summary

Hospital	Technical efficiency	Scale efficiency	Type of scale inefficiency
Andara District Hospital	1	0.676	IRS
Eenhana District Hospital	1	1	-
Engela District Hospital	0.953	0.943	DRS
Gobabis District Hospital	1	1	-
Karasburg District Hospital	1	0.77	IRS
Katima Mulilo District Hospital	1	1	-
Keetmanshoop District Hospital	0.953	0.684	DRS
Khorixas District Hospital	1	0.485	IRS
Luderitz District Hospital	1	0.433	IRS
Mariental District Hospital	0.777	0.461	IRS
Nyangana District Hospital	1	0.553	IRS
Okahandja District Hospital	1	1	-
Okahao District Hospital	1	0.831	IRS
Okakarara District Hospital	1	0.609	IRS
Okongo District Hospital	1	0.799	IRS
Omaruru District Hospital	0.866	0.596	IRS
Opuwo District Hospital	0.808	0.779	IRS
Oshikuku District Hospital	1	1	-
Otiwarongo District Hospital	0.764	0.908	IRS
Outapi District Hospital	0.746	0.67	IRS
Outjo District Hospital	0.849	0.624	IRS

Hospital	Technical efficiency	Scale efficiency	Type of scale inefficiency
Rehoboth District Hospital	1	0.655	IRS
Swakopmund District Hospital	0.839	0.974	IRS
Tsandi District Hospital	0.788	0.608	IRS
Tsumeb District Hospital	1	1	-
Walvis District Hospital	0.68	0.545	IRS
Katutura Referral Hospital	1	1	-
Onanjokwe Referral Hospital	0.568	0.89	IRS
Oshakati Referral Hospital	0.79	0.976	DRS
Rundu Referral Hospital	0.87	0.878	DRS
Windhoek Referral Hospital	0.827	0.711	DRS

In terms of scale efficiency, only 7 of the 31 hospitals had a scale efficiency score of 100 percent, implying that they had the most productive scale size for that particular input–output mix. The remaining hospitals were found to be scale inefficient, with a mean scale efficiency score of 71 percent. Of these scale-inefficient hospitals, 19 (79%) showed IRS while the remaining 5 (21%) hospitals demonstrated DRS. This implies that 79 percent of the scale-inefficient hospitals were too small for their operations and would need to expand their operations. This, however, will require that the demand for the hospital services (the output) needs also to keep up with the increased level of services to be produced by the 19 hospitals. This poses a practical challenge, given the size and distribution of the population of Namibia. On the other hand, five of the hospitals need to scale down their operation to reach the ideal input–output mix.

It is noted that the majority of the inefficient hospitals experiencing increasing returns to scale are district hospitals, while most of the inefficient referral hospitals experience decreasing returns to scale. This indicates that the scale of operations of the various inefficient hospitals could be improved through a strengthened referral system. Strengthening the capacity of district hospitals to manage more complex patients or cases would reduce the number of referrals to referral hospitals. This would result in higher levels of outputs at district levels—which in turn would improve the level of scale efficiency—while it would simultaneously reduce the burden on referral hospitals including its levels of outputs, also resulting in improved scale efficiencies in terms of their decreasing returns to scale.

Since the output variables are demand driven and not directly influenced by the hospitals or even the MoHSS, further analyses relating to the improvement of inefficiencies will focus on the input variables only. A closer look at the technically inefficient hospitals reveals a room for the ministry and the regional health offices to shift some of the inputs that are in excess in the hospitals to primary facilities that often face shortages. Almost all of these hospitals have more clinical staff than needed compared to their output that can be considered for reassignment to health facilities that have shortages. The analysis reveals that around 950 clinical staff in these hospitals can be reassigned to primary health facilities that have shortages. Addressing the inefficiencies in use of the non-salary-recurrent budget allocations efficiently will help release around NAD177 million, which can be used elsewhere. This amounts to savings of the 32 percent in clinical staff costs, 5 percent in nonclinical staff costs, 46 percent in non-salary-recurrent expenditures, and 14 percent in the number of beds.

Table 3: Potential input savings through addressing technical inefficiencies

Inputs	Potential saving
Clinical Staff	950
Nonclinical Staff	21
Nonsalary-recurrent Expenditure (NAD$)	177,498,170
Number of Beds	52

Table 4 shows the savings that can be achieved by each hospital if the reductions in inputs are adopted. The most significant savings would be achieved in Opuwo District Hospital and Omaruru District Hospital with 56 percent and 46 percent reduction respectively in clinical staff costs, and Mariental District Hospital and Windhoek Central Referral Hospital with reductions of 58 percent and 54 percent respectively in non-salary-recurrent expenditures.

Table 4: Savings of improved efficiencies

Hospital	Clinical staff	Nonclinical staff	Recurrent expenditure	Beds
Engela District Hospital	0%	0%	0%	20%
Keetmanshoop District Hospital	28%	0%	0%	0%
Mariental District Hospital	12%	0%	58%	0%
Omaruru District Hospital	46%	10%	0%	0%
Onandjokwe District Hospital	9%	4%	0%	0%
Opuwo District Hospital	56%	0%	26%	0%
Otjiwarongo District Hospital	21%	0%	0%	5%
Outapi District Hospital	5%	0%	0%	0%
Swakopmund District Hospital	10%	0%	0%	0%
Tsandi District Hospital	12%	0%	0%	0%
Oshakati Referral Hospital	30%	0%	0%	0%
Rundu Referral Hospital	29%	0%	9%	0%
Windhoek Central Referral Hospital	45%	0%	54%	0%

While the hospitals overall operate at a relatively efficient level, there is a lot of room for efficiency improvements, particularly in terms of the allocation of clinical staff and recurrent expenditures. The public sector is often plagued by a shortage of skilled clinical staff, and while that may be the case for the health sector as a whole, the results indicate that there is scope for addressing these shortages to some extent through improved reallocation of clinical staff. The MoHSS has also been considering the introduction of a resource allocation formula, which would take into consideration population sizes and regional health needs/disease burden to allocate resources to regions. The implementation of a refined resource allocation formula to replace the historical budgeting approach currently used is likely to assist in ensuring resources are allocated more effectively and reduce the current wastage of 46 percent among inefficient hospitals.

3.2 Qualitative Review of the Inefficiencies

In addition to the quantitative data that were collected for this efficiency study, interviews were conducted with key facility staff at a sample of hospitals only to gain insight into their perspectives on the causes of inefficiency in their facilities. In contrast to the findings from the quantitative analysis, in interviews with key facility staff in selected hospitals, staff shortages were noted as a major constraint in service delivery in almost all hospitals interviewed. The population numbers and the need for health services keep increasing but the staff establishment remains the same. Some of the staff interviewed noted that staff lack adequate training—particularly nurses—which inhibits their ability to properly perform their duties. The problem of insufficient training is exacerbated by the fact that staffs are not able to attend trainings because there is not sufficient staff to cover the workload in their absence. Furthermore, concerns have been raised about the quality of training and skills of young doctors, as they are lacking not only experience but also some of the basic skills and knowledge required to perform the duties as a doctor. Although lower staff skill levels allow the hospitals to keep their payroll expenditures down, the result may be that many other costs ultimately cause inefficiencies. Overworked and inappropriately trained staff can result in poorer health outcomes due to incorrect diagnoses and treatment, which in the longer term may result in the need for more expensive treatment options and multiple return visits.

As a result of the lack of experience and skills among young doctors, the hospital staffs interviewed stated that there is an overuse of laboratory tests. The doctors tend to prescribe more laboratory tests than necessary because they are unsure of possible diagnoses and therefore perform multiple tests to cover all bases. This problem is especially found among interns, who lack experience and better judgement or analysis of symptoms. Performing unnecessary laboratory tests significantly increases the costs incurred by hospitals and thus increases their level of inefficiency.

In general, most facilities noted that they did not experience many problems with pharmaceutical stock outs—particularly for those that are most frequently used—but that there have been stock outs of more specialized drugs and second-line treatments. Many of the hospitals noted that they revert to buy-outs, which means that they procure pharmaceuticals and clinical supplies from private pharmacies due to the products not being readily available through central medical stores. Furthermore, some hospitals complained that some of the stock that they receive from central medical stores is close to its expiry date, which then results in spoilage of the stock at the facilities. They noted that this is not a fair practice, because it gives the impression that the hospitals are not capable of effectively managing their stock. One of the hospitals noted that they have stock outs of clinical supplies, which requires them to reuse clinical supplies that are not reusable. Although they noted that they do sterilize the items before reusing them, the practice is not ideal because the quality of the supplies may remain compromised and pose a significant risk in terms of infection control. The same facility noted that patients often pool funds to buy clinical supplies from private pharmacies for use in their treatment in the public hospital. Some facilities have noted that there are inefficiencies due to wastage, with pharmaceuticals being prescribed unnecessarily and clinical supplies wasted due to clinicians not being conscious of cost implications.

Another major concern that was raised by the hospitals is the functionality of the economizing committees. These committees are established to regularly review the hospitals' procurement needs and make decisions on procurements that should be made based on priorities. These committees are also responsible to evaluate the procurement options, quotations for goods or services, and make the vendor selection. The key concern that was noted in relation to the economizing committees is that they do not fully understand and appreciate their roles in terms of accountability and the prudent management of funds. Instances have been noted where procurements have been issued multiple times as there is no control over what has been approved and authorized and the quality and completion of work is not monitored prior to payment. Such flaws in the procurement system can lead to significant

wastage of resources. This issue has, however, been resolved to some extent with the introduction of the central procurement committee, although there are significant concerns about the resulting delays in the procurement process.

4. CONCLUSIONS AND RECOMMENDATIONS

Around half of the hospitals included in this study were found to be technically inefficient, which means that they could improve their operations in order to be more efficient. The mean technical efficiency score for these inefficient hospitals was 81 percent. However, with some facilities having a technical efficiency score of 57 percent, there is significant potential for efficiency gains. Overall, the technically inefficient hospitals could improve their efficiency for savings of 19 percent on inputs without affecting the output levels.

Further analysis of the hospitals brought to light the vast majority that had a scale efficiency score of less than 100 percent, with a mean scale efficiency score of 71 percent, implying that the input–output mix in these hospitals is inefficient. Most of the scale-inefficient hospitals showed IRS, which means that the hospitals' outputs should be increased to reduce the unit costs. Since the outputs are driven by the demand for healthcare services and are mostly out of the control of the hospitals, the size of the hospitals should be reduced to improve the scale efficiency. However, the scale efficiencies differ between district and referral hospitals, which implies that scale efficiencies can be addressed to some extent through improvements in the national referral system. By reducing the number of referrals from district hospitals to referral hospitals, the scale efficiencies of both district and referral hospitals would be improved simultaneously.

The most significant efficiency savings can be achieved through improved redistribution of clinical staff and allocation of non-salary-recurrent expenditure budgets. Assuming that all facilities would address these inefficiencies, the total savings for the relevant hospitals would amount to 32 percent in clinical staff costs, 5 percent in nonclinical staff costs, 46 percent in recurrent expenditures, and 14 percent in the number of beds.

While measures to achieve cost savings in some of these areas cannot be implemented in the short term, such as a reduction in a facility's size and bed capacity, there are other measures that the MoHSS could improve as a matter of priority. The two critical considerations for the ministry would be the reallocation of clinical staff and the introduction of an appropriate resource allocation formula that would allow for resources to be distributed to regions and their respective health facilities and hospitals according to the health needs and utilization of health services.

With the current pressure on government in terms of budget cuts, economic constraints, and reducing donor funding for health, it is critical that the government take action to ensure that the limited resources available are used to their maximum benefit. Efficiency measures should be instituted as a matter of priority and pursued consistently to ensure that the health gains achieved with the resources available are maximized.

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