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**Small Applied Research Report No. 11**

**UNIT COST AND FINANCIAL ANALYSIS  
FOR THE HOSPITAL 12 DE ABRIL IN BOLIVIA**

**Submitted to:**

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## **ABSTRACT**

To determine whether there is underutilization of Bolivian Social Security System facilities, one sample hospital—the Hospital del Niño 12 de Abril—was studied over a period of four months. Unit costs of in-patient services were determined, alternate financing mechanisms were proposed, and results were discussed with the Social Security management.

The Social Security System is one of three major providers of health care for Bolivians. The Hospital 12 de Abril, a referral hospital under this jurisdiction, has 58 beds and cares for children aged 15 and under who have infectious diseases.

Data was collected on factors such as production, occupancy level, and length of stay, and a break-even analysis was performed to determine which cost recovery schemes should be used. It was determined that generally the hospital's inefficiencies stemmed from a high level of staffing and a low number of patients served. The results were presented by the researchers to hospital administrators. Recommendations concerning cost recovery that resulted from the discussion included the suggestion that the hospital begin competing for patients in the private market. In addition, it was suggested that processing of cost and utilization be performed at the hospital using desktop computers and that a similar cost analysis be undertaken at other Social Security facilities.

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## **ACRONYMS**

<b>ALOS</b>	<b>average length of stay</b>
<b>AR</b>	<b>applied research</b>
<b>ARI</b>	<b>acute respiratory infection</b>
<b>CNS</b>	<b>Caja Nacional de Salud</b>
<b>CNSS</b>	<b>Caja Nacional de Seguridad Social</b>
<b>HFS</b>	<b>Health Financing and Sustainability</b>
<b>IBSS</b>	<b>Istituto Boliviano de Seguridad Social</b>
<b>MOH</b>	<b>Ministry of Health</b>
<b>MPSSP</b>	<b>Ministerio de Prevision Social y Salud Publica</b>
<b>PAHO</b>	<b>Pan American Health Organization</b>
<b>SAR</b>	<b>small applied research</b>

## FOREWORD

The Health Financing and Sustainability (HFS) Project provides technical assistance and conducts applied research, training, and information dissemination to developing countries in health economics, health sector policy development, and health services management. The applied research (AR) component of the project provides opportunities to increase knowledge of the complex issues underlying health financing problems and augments the supply of qualified individuals who can contribute to policy analysis and reform. HFS is emphasizing the following policy areas for AR activities: cost recovery, productive efficiency, social financing, and private sector development in the health sector.

As part of the project's AR component, HFS will complete up to 30 small applied research (SAR) activities during the life of the project, from 1989 through 1994. These include studies undertaken by developing country researchers, HFS researchers, or academics at universities in the United States. The objectives of the SAR program are to carry out practically oriented research in developing countries and to encourage the development of local capacities to undertake research.

Most SAR activities are initiated through proposals to the HFS Project. The proposals are evaluated by HFS staff using such criteria as: practical policy orientation, resource and time requirements, and appropriateness to the HFS research agenda. Most proposals for SAR activities accepted by HFS undergo several revisions as the researchers refine their research objectives, hypotheses, and methodologies, based on suggestions and comments from the HFS staff. Once approved, SAR activities are overseen by HFS task managers, who work closely with principal investigators to monitor the timeliness and quality of the work and facilitate logistics.

Other SAR studies are done in conjunction with technical assistance or major applied research activities of the HFS Project. In these cases, the SAR contributes to the technical guidance provided to clients, or adds to the body of knowledge on topics of health financing and economics.

As with all HFS research, drafts of SAR reports are reviewed by HFS staff. Drafts are then evaluated by external technical reviewers selected on the basis of substantive and/or geographical expertise.

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## EXECUTIVE SUMMARY

The purpose of this research was to study the suspected underutilization of hospital facilities of the Bolivian Social Security System (Caja Nacional de Salud, CNS). Specific objectives were to investigate the extent of underutilization at the Hospital del Niño 12 de Abril; to determine the unit costs for in-patient services at the hospital; to study alternative financing schemes; to define a set of feasible financing schemes for the hospital; and to discuss these results with the CNS authorities.

As background, health status indicators in Bolivia show room for improvement. Morbidity patterns are similar to those of very poor countries. In addition, Bolivia is one of the poorest countries in the Western hemisphere. Bolivian health care services are provided by three general subsectors: the public, social security, and private. The major institution in the public sector is the Ministerio de Prevision Social y Salud Publica (MPSSP). The CNS is the largest segment of the social security system. The CNS is an autonomous public institution supervised by the Bolivian Institute of Social Security and the Ministry of Health. Its objectives are to protect the health of insured employees and their families; to guarantee the employees' income if they become disabled; and to contribute toward improving the health of insured employees and their families. The CNS operates hospitals, policlinics, and health posts in nine regions.

The Hospital 12 de Abril is a 58-bed CNS hospital. It treats only children 15 years of age or younger with infectious diseases. As a referral hospital, in-patient services are provided to those referred from CNS hospitals and policlinics in La Paz. No self-referrals are allowed.

The study collected detailed production and cost data for the year 1992 and aggregated information for the years 1988-1992. Costs were assigned to seven cost centers. Remunerations were obtained and grouped across all cost centers. Costs were divided into personnel and other costs. The cost of a single patient-day (the unit cost) were calculated. The production and cost data were analyzed for the degree of underutilization. A break-even analysis was used to evaluate different cost recovery schemes.

The production level at Hospital 12 de Abril was evaluated using patient discharges, patient days per month, average length of stay, and occupancy. During the 36 months of the study, patient discharges in excess of 80 were recorded during only three months. Discharges, patient days, and average lengths of stays showed little variation over the three-year period. The occupancy rate never exceeded 38 percent during the study. This low occupancy indicates overstaffing of the hospital. Further analysis of the occupancy figures in comparison with other CNS hospitals is recommended to determine the extent of the underutilization due to case mix.

The breakdown of costs at Hospital 12 de Abril were found to be approximately 78 percent for personnel costs, 7 percent for fixed costs, and 14 percent for variable costs. Recalculating the costs with an increase from 36 percent occupancy to 80 percent occupancy, without changing the level of staffing, shows a decrease in the projected cost per patient day. The results suggest that the Hospital 12 de Abril is inefficient due to high levels of staffing and low numbers of patients served.

To improve hospital efficiency, the CNS could either increase the number of insured people in the system or increase utilization. Due to economic conditions, it is believed that it would be hard to increase the number of insureds in the system. Services could be offered on the open market on a fee-for-service basis or an arrangement could be made with the MPSSP to use the hospital as an alternative to the Ministry's Children's Hospital.

The study proceeded to evaluate possible prices and the estimated effects on efficiency. The analysis shows that a price of Bs. 55 would be a break-even price for Hospital 12 de Abril, which is lower than the prices at other hospitals. The strengths and weaknesses of each approach are presented.

The researchers presented the results of this study during a half-day meeting at the CNS. There was significant discussion regarding low utilization at the hospital. It was felt by the hospital administrator that the long lengths of stay were the result of the severe nature of the patient illnesses (case mix). There was interest in the cost analysis. Of the two cost recovery options presented, a consensus was reached that Hospital 12 de Abril should proceed to compete for patients in the private market. A possible problem could arise if the receipts cannot be shared as bonuses with the facility personnel.

The research team's suggestions included:

- ▲ Presentation of the cost recovery proposal to the relevant government agencies;
- ▲ Replication of the cost analysis at other CNS facilities; and
- ▲ Processing of cost and utilization data at the hospital level using desktop computers.

# 1.0 INTRODUCTION

## 1.1 PROJECT BACKGROUND

In response to a call for proposals for smaller applied research projects issued by the Health Finance Sustainability (HFS) Project, a proposal was drafted to investigate alternative financing schemes to deal with the suspected underutilization of hospital facilities by the Bolivian Social Security System (Caja Nacional de Salud, CNS).

After some revisions, the proposal was accepted and a four-month project was funded to study utilization, costs, and alternative financing schemes for one CNS Hospital: the pediatric Hospital 12 de Abril. Official funding was approved in January 1993 and the project end date was set for May 30, 1993.

To carry out the project, the principal researcher, Dr. Manuel Olave, was contracted for 24 consulting days and a research assistant, Lic. Zulma Montaña, worked full-time for the four-month lifespan of the project.

## 1.2 PROJECT OBJECTIVES

The principal objective of this project was to make CNS managers cognizant of the underutilization problem and to motivate them to consider alternative financing schemes to help defray costs.

The specific objectives were the following:

- ▲ To investigate the extent of underutilization at the Hospital 12 de Abril;
- ▲ To determine unit costs for in-patient services at the Hospital 12 de Abril;
- ▲ To study alternative financing schemes used in other countries to finance hospital care;
- ▲ To define a set of feasible financing schemes to be applied at the Hospital 12 de Abril; and
- ▲ To discuss these results with the CNS authorities.

## 1.3 ORGANIZATION OF THE REPORT

This report presents the objectives and scope of the study, the methodology employed, the results obtained, and an analysis of the results in relation to their use by appropriate authorities in the decisionmaking process. The analysis is based on a model developed for projecting income and costs. The report also includes a brief overview of health and economic conditions and of the status of the health care system in Bolivia.

## 2.0 BACKGROUND

### 2.1 GENERAL BACKGROUND

Bolivia covers 1.1 million square kilometers and, according to the latest census (1992), has a population of 6.344 million persons. The Bolivian population is young and increasingly urban. The 1992 census indicated that 58 percent of the population is urban compared to 42 percent in 1976.

Bolivia is an Andean country comprised of three distinct regions: the Altiplano, the Valleys, and the Plains (Llanos). The Altiplano region covers 21 percent of the nation and makes up most of the western portion of the country. The Altiplano contains 45 percent of the total population and includes some of the poorest rural districts in the country. The Valleys region in the central portion of the country comprises 16 percent of the total area and 29 percent of the population. The eastern portion of the country, the largest of the three regions, is known as the Plains. Although the Plains region encompasses 62 percent of the national territory, it contains only 26 percent of the Bolivian population.

The scarcity of adequate communication and transportation systems has added to the divisive effect of both the Andes Mountains and the numerous subcultures in Bolivia, which has accentuated Bolivia's international isolation and its unresolved internal problems with integration.

### 2.2 HEALTH CONDITIONS

Health status indicators show that Bolivia is among the poorest of Latin American countries. The infant mortality rate, often regarded as the single best measure of a people's health status, was computed to be 75 per 1,000 live births in the 1992 census. The infant mortality rate of neighboring Peru, a country that is historically, culturally, geographically, and climatically very similar to Bolivia, stands at 68.

The World Bank's 1993 *World Development Report* indicates that the life expectancy for Bolivian men in 1991 was 57 years and 61 years for women, which rank among the lowest of all countries in the Americas. The maternal mortality rate in Bolivia is 48 per 10,000 births, more than 50 percent higher than Peru's rate of 30.

While health status indicators for Bolivia as a whole are not high, it is important to note that these national totals mask significant variations across the country's three regions. For example, some isolated segments of the country have infant mortality rates that are considerably higher than the national average. *Exhibit 2-1* shows the great differences that exist in the mortality rates of children under age five in eight departmental capital cities (this contains outdated information because the regional mortality rates for 1992 are unavailable).

EXHIBIT 2-1 REGIONAL MORTALITY RATES OF CHILDREN UNDER AGE 5 (per 1,000 live births)		
CITY	1983-84	REGION
Potosí	171.3	Altiplano
Oruro	149.9	Altiplano
Cochabamba	147.6	Valley
Santa Cruz	135.6	Llanos
La Paz	133.5	Altiplano
Sucre	108.1	Valley
Trinidad	97.9	Llanos
Tarija	82.4	Valley
Source: UNICEF, 1983		

Morbidity patterns in Bolivia are characteristic of very poor countries, with infectious diseases predominating. According to the Ministry of Health's (MOH) General Directorate for Epidemiology, the three primary causes of illness throughout 1985-1988 were acute diarrheal disease, respiratory infections, and malaria. The chief causes of mortality mirrored these leading causes of morbidity. A recent Pan American Health Organization (PAHO) study of the leading causes of death among children under three years of age found that acute diarrheal disease and respiratory infections accounted for 60 percent of all such deaths.

## 2.3 ECONOMIC CONDITIONS

Bolivia is one of the poorest countries in the Western hemisphere. The international economic crisis of the 1980s, particularly the fall in the price of primary commodities, has had serious repercussions for the country's economy, which was based predominantly upon the extraction and exportation of minerals and hydrocarbons.

Bolivia experienced high rates of economic growth during the 1970s, largely as a result of high international prices for tin and petroleum products. As the prices of these commodities began to fall toward the end of the 1970s, so too did Bolivia's short-lived period of relative prosperity. Along with the macroeconomic slump came political instability, which culminated in a re-establishment of democracy in 1982. The resulting populist government, however, was besieged by various pressure groups and proved unable to muster the political will to adequately address the economic crisis. Inflation and unemployment rose, the external debt soared, the country's ability to service its external debt faltered, and the standard of living fell.

From the start of the 1980s until 1987, Bolivia's annual economic growth rate was generally negative. The situation reached a crisis in mid-1985 when the annual rate of inflation exceeded 24,000 percent. Since then, Bolivia's governments have successfully implemented a series of macroeconomic stabilization and adjustment policies. These policies have reduced public sector expenditures and stimulated the private sector.

Although the stabilization policies have been successful in reducing inflation to single-digit numbers and in restoring confidence, investment, and economic growth, they have done so at the cost of exacerbating social problems. Unemployment has grown, exceeding 20 percent within the economically active population in 1986, as has underemployment. The restrictions on government expenditures intended to curb inflation affected expenditures on education and health, and, to help finance health programs, user fees were introduced at all levels in what were previously free-of-charge public health care services.

## **2.4 HEALTH CARE SERVICES**

Health care services in Bolivia may be classified into three general subsectors: the public subsector, in which the major institution is the "Ministerio de Prevision Social y Salud Publica" (MPSSP); the Social Security subsector; and the private subsector.

The largest of the subsectors, the MPSSP, provides services to 26 percent of the urban and 35 percent of the rural population. Another 21 percent of the urban population is covered by the CNS, which actually consists of several highly segmented, individual social security systems, each with its own administrative and health care delivery system. The third subsector, the private sector, is responsible for another 28 percent of the urban and 9 percent of the rural population. Approximately 38 percent of all Bolivians have no access to modern health care.

## **2.5 THE MINISTRY OF SOCIAL PROVISION AND PUBLIC HEALTH**

The titular head of the health sector in Bolivia is the Ministry of Health (MOH). The MPSSP is administratively centralized and headed by the Office of the Minister. A number of advisory offices, together with the subsecretaries of social security and public health, form the top tier of policymakers.

The MPSSP's administrative structure was designed to manage and provide services. The national administration is regionalized, incorporating various levels of administration and services. At the higher administration levels, the domain and complexity of service delivery units are increased. The first level is composed of Health Areas. The Health Areas are defined geographic areas that constitute programming units for MOH activities. The service delivery units at the Health Area level are health posts and health centers, which are located in the capital cities of each Health Area.

The Health Areas are grouped into administrative units called "Distritos" (geographic districts), which constitute the second organizational level of the MPSSP. The service delivery unit at this level is the District's Health Center-Hospital (Centro de Salud-Hospitalaria del Distrito), which contains up to 50 beds.

The next level is the Sanitary Unit. There are 12 Sanitary Units in the country: Cochabamba, Chuquisaca, La Paz, Oruro, Potosí, Ríberalta, Santa Cruz, Tarija, Tupiza, Beni, Pando, and El Alto. As their names suggest, the Units' domains generally coincide with Bolivia's Departments (states). The corresponding health facility functioning at this third level is the regional hospital.

The highest level is the national level. Organizationally, this fourth level is made up of the MOH Central Administration and the most highly-specialized national referral hospitals.

## **2.6 LA CAJA NACIONAL DE SALUD**

The establishment of a compulsory social security system in Bolivia dates back to January 7, 1949, when the "Seguro Social General Obligatorio" was promulgated into law, thereby creating the "Caja Nacional de Seguro Social" (National Insurance Agency) as the implementing agency under the supervision of the "Instituto Boliviano de Seguridad Social" (IBSS).

In 1956, the Social Security Statute was given the mandate to provide protection to Bolivian workers in the following areas:

- ▲ Sickness;
- ▲ Maternity;
- ▲ Professional risk;
- ▲ Disability;
- ▲ Retirement; and
- ▲ Death (life insurance).

Under this statute, the "Caja Nacional de Seguro Social" was replaced by the "Caja Nacional de Seguridad Social" (CNSS), the National Social Security Agency, with approximately 84 percent of the total population insured. The remaining 16 percent were covered by sectoral insurance agencies such as those for railway workers and military personnel. The CNSS absorbed most employees' pension funds (excluding railway workers and military personnel) and had the dual responsibility of providing health and economic benefits. The health benefits included sickness and professional risk, whereas the economic benefits included temporary disability subsidies, total disability retirement, and life insurance.

To finance its services, the CNSS established the following contributions: from employees, 3.59 percent of their monthly salaries, and from employers, 12 percent of the total monthly for salaries. These funds were to be distributed as follows: 8 percent of employer funds would go to finance professional health insurance, maternity, and short-term risk, and 4 percent to finance disability, retirement, and life insurance; 2 percent of employee funds would go to finance health and maternity insurance and 1.5 percent to finance disability, retirement, and life insurance.

This scheme was only partially successful, since many industrial sectors established their own social security programs, among them the railroad, petroleum, and transportation industries.

On April 15, 1987, the Bolivian Congress approved a law to regulate the administration of the services provided by the Social Security System. The law was complemented by the Supreme Decree Number 21637 of June 25, 1987, which set down the rules and regulations required for implementation.

The new legal framework established two clearly defined service areas:

- (1) Provision of Health Services ("Cajas de Salud"), responsible for the management and provision of health, maternity, and short-term risk insurance, and
- (2) Pension Funds, responsible for the management and provision of workers' protection in the areas of disability, retirement, death, and long-term professional risk.

The CNSS became the main executing agency for the provision of health under its new title, "Caja Nacional de Salud" (CNS).

To fulfill its new mandate, the board of Directors of the CNS established a new statute on March 23, 1988. This statute provided the basic organizational structure of the CNS into four sections, 14 chapters, and 58 articles.

The CNS is defined as an autonomous public institution supervised by the IBSS and the MOH, whose objectives can be summarized as follows:

- (1) To protect the health of insured employees and their families;
- (2) To guarantee employees' income if they become disabled; and
- (3) To contribute toward improving the health of insured employees and their families.

To meet these objectives, the CNS maintained a organizational structure similar to that of the former CNSS, with a board of directors, an executive president (also president of the board), a general manager, and two area managers in health services and administration/technical. The area managers supervise eight and nine departments, respectively.

The hospitals, clinics, and health posts in each of the nine regions are managed by regional administrators, who report directly to the general manager. The highest level in the organizational structure is the board of directors, consisting of the following members:

- ▲ The President, designated by the President of the Republic;
- ▲ Two state representatives, designated by the ministries of Health and Labor;
- ▲ Two management representatives; and
- ▲ Two labor representatives.

These representatives are named by the MOH, in accordance with the recommendations of representatives from both management and labor.

The board selects the general manager, area managers, and regional and district agency administrators.

A specific decree gave executive authority to the president of the board, which was not included in the original organizational plan. The president is theoretically the chief executive officer during a four-year tenure; in actual practice, however, this has not been borne out: the current president represents the third CEO appointed in the last four years.

To provide health services, the CNS has 41 hospitals, 39 health posts, and 31 policlinics distributed throughout the country and almost exclusively in the urban areas.

## **2.7 EL HOSPITAL DEL NIÑO 12 DE ABRIL**

The Hospital del Niño 12 de Abril opened on April 12, 1956, with the exclusive purpose of serving insured members' children under age 15 years who had infectious diseases.

At the present time, management of the hospital's services stems from two departments: administration and statistics. Hospital services are divided into four areas: physician and nursing staff; biotechnological laboratory; social services; and nutrition and dietary staff.

The 28 administrative, technical, service, and maintenance staff (permanent staff) of the hospital are distributed among the following areas: one nutritionist, two medical team technicians, six general administrative staff, one social worker, one chauffeur, and seventeen manual workers and porters. The physician staff comprises seven full-time physicians, one half-time physician, and two full-time lab technicians. The nursing staff includes a nursing supervisor, seven licensed nurses, and seven auxiliary nurses.

The hospital occupies a three-story building in the zone of Miraflores in La Paz. The ground floor houses management, social services, patient reception, office of medical residency, X-ray, laundry, statistics, and "vigencia de derecho."

On the second floor are the nursing department, breast-feeding station, and four patient rooms with four beds each. The patient beds are divided into two wings: in Wing 1 are patients with hepatitis and diarrheal disease; in Wing 2 are two observation beds and 12 beds for patients admitted with hepatitis, typhoid fever, and transmissible and eruptive diseases.

The third floor contains Wing 3, with 16 beds for acute respiratory infections, 12 beds for tuberculosis, the laboratory, and nursing. On the fourth floor is the auditorium, day care, kitchen, dining hall, dietary office, and food management.

The hospital provides specialized in-patient services for children under age 15 referred by any of the CNS La Paz's neighborhood hospitals and policlinics. In a few cases, it can also take referrals from CNS units from other parts of the country. Patients are only admitted by referrals from the Social Security System (walk-ins are not allowed). If the patients referred require specialized services not offered by the hospital, such as neurology, surgery, and ear, nose, and throat services, they are transferred to the "Hospital Obrero."

Food for all children interned in the hospital is purchased by the head of nutrition for the health administration. Once purchased, the foodstuffs are sent to the food management office in the Hospital Obrero, which every Tuesday apportions it to the Hospital 12 de Abril. The dietician oversees the arrival of the supplies and is in charge of organizing the various diets according to the patients' needs.

Infants' nursing is handled by the nursing assistants on a monthly rotation. During the afternoon shift, a manual laborer prepares the milk formula; on the night shift, it is prepared by the night porter.

Vaccination services are carried out by nurses as needed, rather than being assigned to any specific staff members.

The hospital uses its own ambulance for emergency services during the day and an ambulance from the Hospital Obrero for night emergencies.

Generally, requests for laundry, laboratory, and X-ray supplies are submitted on a trimester basis to the health administration office, which submits the corresponding delivery orders. Petty cash funds are used when supplies run out between orders. Petty cash funds are the only monies handled directly by the hospital administration; receipts indicate that the amounts paid out run between Bs. 330 and Bs. 500 (\$105-\$160 at the December 1992 official exchange rate).

All hospital personnel are hired by the central office, which manages all administrative functions including payment of wages. The Hospital 12 de Abril, along with all the other hospitals from the CNS, participates in the university teaching system for medical school interns and residents.

The laboratory technician works Monday through Saturday, from 7:30 a.m. to 3:30 p.m. The hospital's laboratory services are provided principally for its patients, but also serve, on a smaller scale, the requirements of the psychiatric, miraflores, and 9 de Abril hospitals.

## 3.0 METHODOLOGY

The study was carried out in five distinct phases:

### **Phase 1: Desk Study and Project Organization**

In this first phase, the team was assembled and all the logistical activities were executed, such as office and equipment rental. The time allotted for this phase also was utilized to review the HFS-provided literature on hospital financing experiences in other developing countries and to study all the pertinent documentation available at the CNS. To conclude this phase, interviews were carried out with CNS executives to determine the hospital to be studied and define the problem to be analyzed.

### **Phase 2: Data Collection and Processing**

After the hospital to be studied was identified at the suggestion of the medical services manager of the CNS, and once official permission to gather data was granted, the research team visited the director of the Hospital 12 de Abril and prepared a schedule of visits to obtain detailed production and cost data for the year 1992 and aggregated information for 1988-1992.

Production Data. The information on admissions, discharges, and patient days for the period 1990-1992 is based upon the daily admissions log and patient register maintained by the nursing department. Information collected for 1988 and 1989 was obtained from the annual records of the CNS. The description of the hospital's present capacities was derived from this same source.

The data on length of stay by type of sickness for the year 1992 were taken from the statistical report on hospital discharges of the CNS Department of Statistics.

Cost Data: All costs incurred in the production of services (input costs) were gathered from the hospital accounting records and assigned to the following cost centers:

- ▲ Administration
- ▲ Laundry
- ▲ Food Service
- ▲ Transportation
- ▲ Laboratory and X-Rays
- ▲ Pediatrics
- ▲ Pharmacy and Medical Materials

To put into effect this assignation of costs, a computerized data base of cost information was designed and all expenses were designated to a specific cost center according to the codification. The costs in every cost center are also grouped under "Remunerations and Other Costs."

Remunerations were obtained from the monthly pay registers, recorded in the daily logbook, for the period January-December 1992. To this total was added benefits as detailed by the staff, such as tea service and staff transportation subsidies. Information on these expenses was gathered from the daily logbook trimester reports and assigned to each cost center according to the particular activity undertaken by each of the personnel members working in the center.

Costs associated with the administration cost center include office supplies, minor and unexpected expenditures, cleaning supplies, building maintenance, office equipment, and operating costs such as water, light, and telephone, which are included under "Other Costs."

The costs of the laundry cost center include supplies used in the laundry and were obtained for each trimester of 1992 from the daily logbook and storeroom receipts.

The food service cost center includes costs corresponding to purchase of kitchen supplies and equipment used to prepare patients' daily meals. The information was obtained in monthly form from the daily logbook.

The costs related to the transportation cost center include maintenance costs and gasoline for the ambulance. The information used was drawn from the daily logbook and storeroom receipts.

The laboratory and X-ray cost center expenses represent supplies purchased for its functioning. This information was obtained from the receipts register, where it is classified on a trimester basis for the first half of 1992 and on a semester basis for the second half of the year.

Within the pharmacy and medical supplies cost center, costs break down as follows: Medications include the costs of pharmacy medications transferred to the Hospital 12 de Abril from the Hospital Obrero, which necessitated identifying and extracting the exact amounts sent to Hospital 12 de Abril from the Hospital Obrero medicine delivery log files. This identification proved difficult since, at the time of the study, the medications inventory for 1992 still had not been completed, and thus the information was incomplete. The costs associated with medical supplies include expenditures for pharmaceutical supplies, minor and major medical equipment, and materials for the repair of hospital equipment. All of these costs derive from the hospital's pediatric services. Supplies costs were obtained from receipts. To these costs were added expenditures for oxygen, as noted in purchase orders collected from the Hospital 12 de Abril archives.

### **Phase 3: Unit Cost Calculation**

The total costs were assigned to each cost center and classified into "Personnel" and "Other Costs." Since at the Hospital 12 de Abril there is only one service center (pediatrics), all the input costs were allocated to this service center and classified as either fixed or variable costs.

The personnel costs were considered to be fixed during the period of analysis but were kept separate from other fixed costs, such as those related to general administration and utilities.

Variable costs include all those costs that reflect volume of activity such as drugs, medical, and laboratory supplies and food and laundry service.

The in-patient unit cost, or the cost of a single patient day, in the hospital was calculated as the sum of the unit fixed cost, the unit variable cost, and the unit personnel cost. These unit costs were calculated by dividing the respective total annual costs (personnel, fixed, and variable) by the number of patient days.

#### **Phase 4: Analysis and Interpretation of Results**

In this phase, the production and cost data were analyzed to determine the degree of under-utilization of the hospital's installed capacity and to evaluate the unit costs as a function of projected utilization level.

A simple break-even analysis was carried out to determine the impact of alternative cost recovery schemes, and the proposed fees were compared with the results of a simple survey of prices charged by private hospitals with similar characteristics than those of the Hospital 12 de Abril.

Finally, a set of alternative cost recovery schemes was analyzed as a function of economic impact and these results were summarized for consideration by top CNS executives at the final workshop.

#### **Phase 5: Presentation of Results**

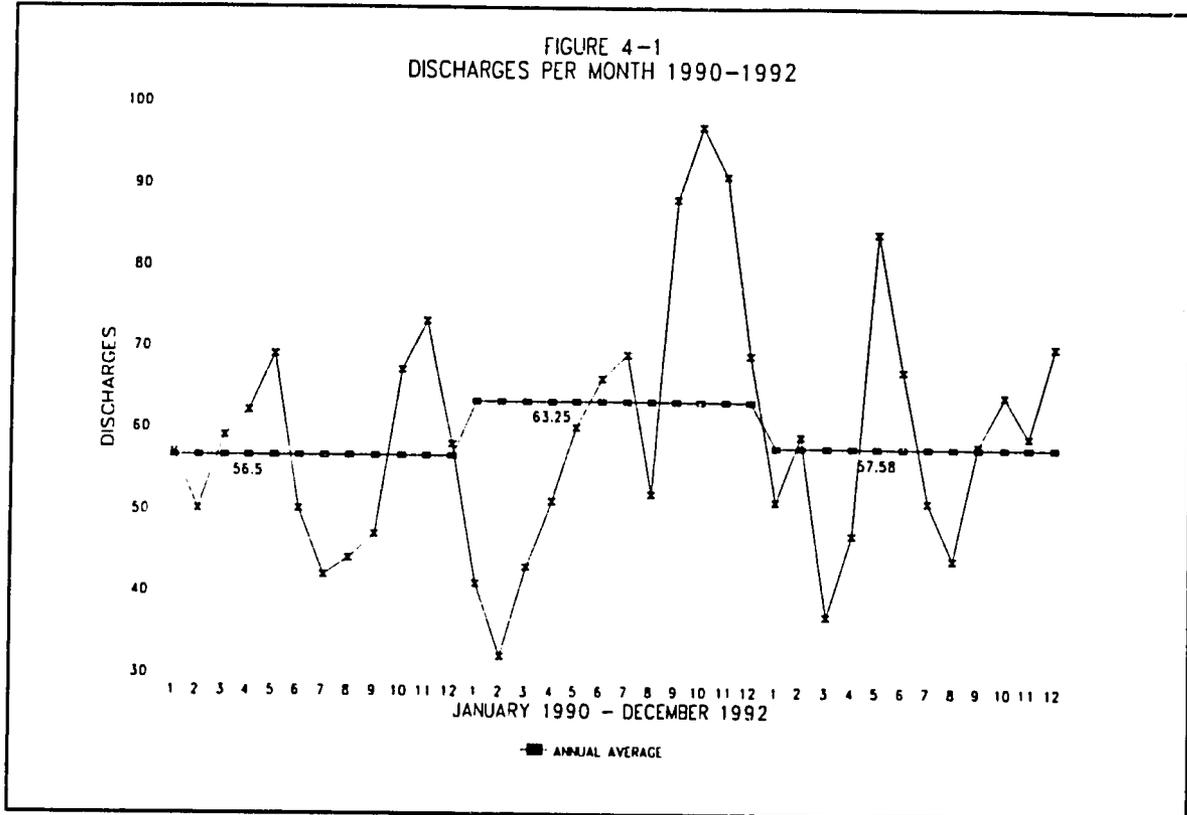
This final phase included the drafting of the final report and the preparation and delivery of the workshop to analyze the project results with top CNS executives.

## 4.0 ANALYSIS AND FINDINGS

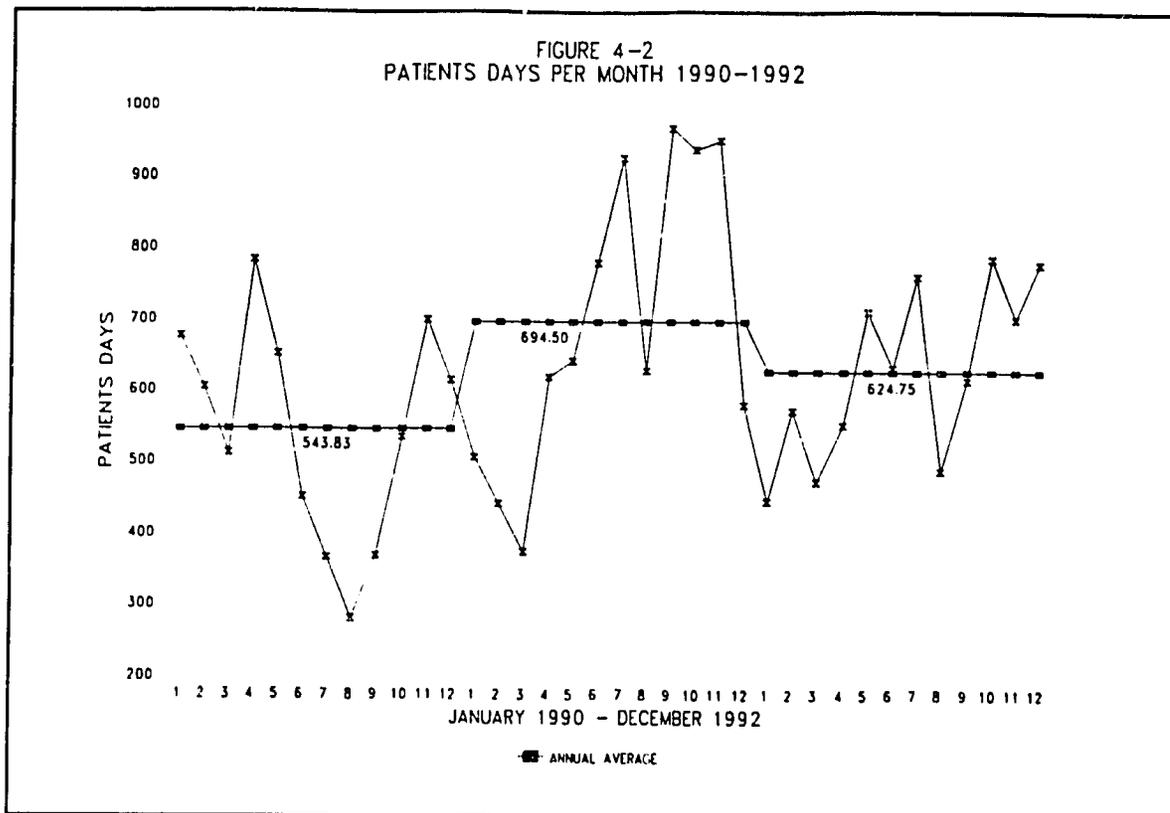
### 4.1 PRODUCTION

The production level of services at the Hospital 12 de Abril is analyzed in this section in accordance with the following variables: patient discharges, patient days per month, average length of stay (ALOS), and the utilization of facility capacity.

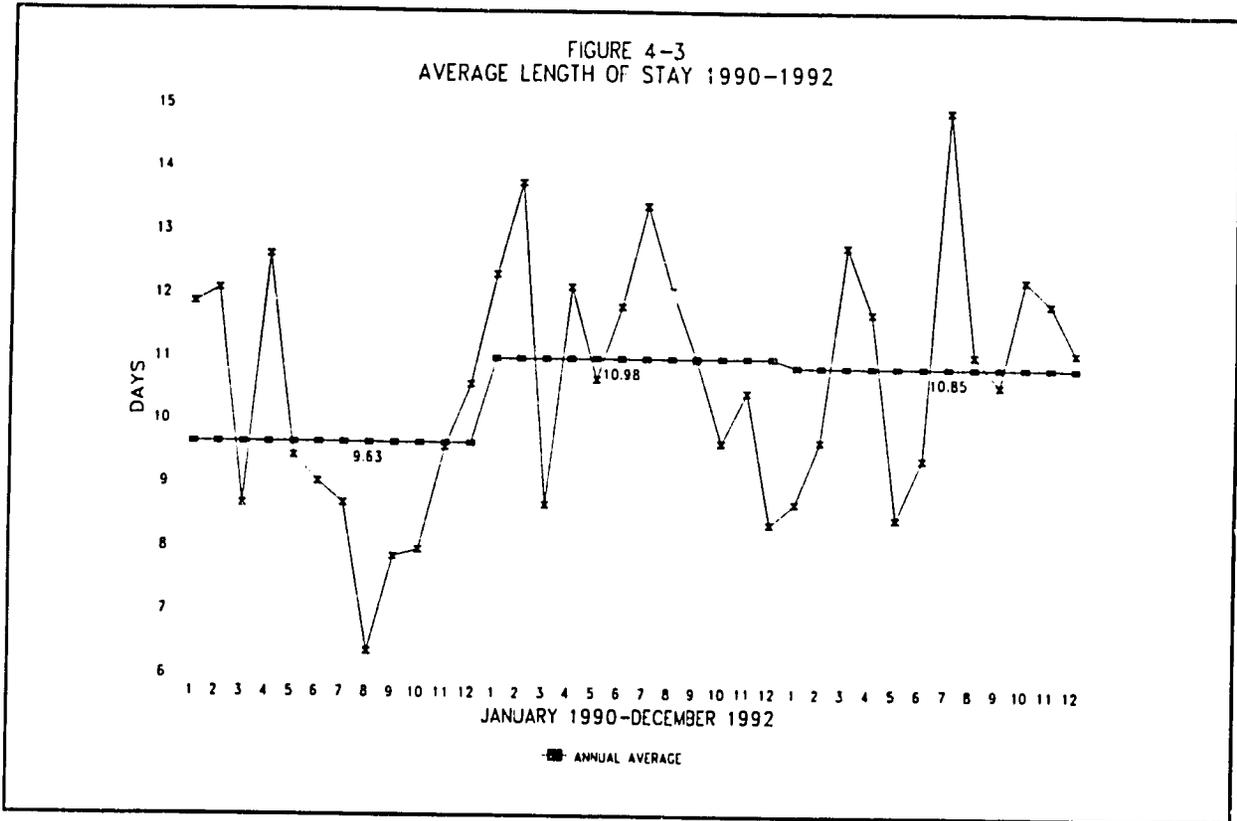
As is evident in *Figure 4-1*, monthly discharges for 1990-1992 are characterized by similar annual averages of approximately 60 discharges per month. The year 1991 presented the greatest fluctuations per month, reaching a high of 97 discharges during October and a low of 32 during February. During the 36 months under study, only three months had patient discharges in excess of 80.



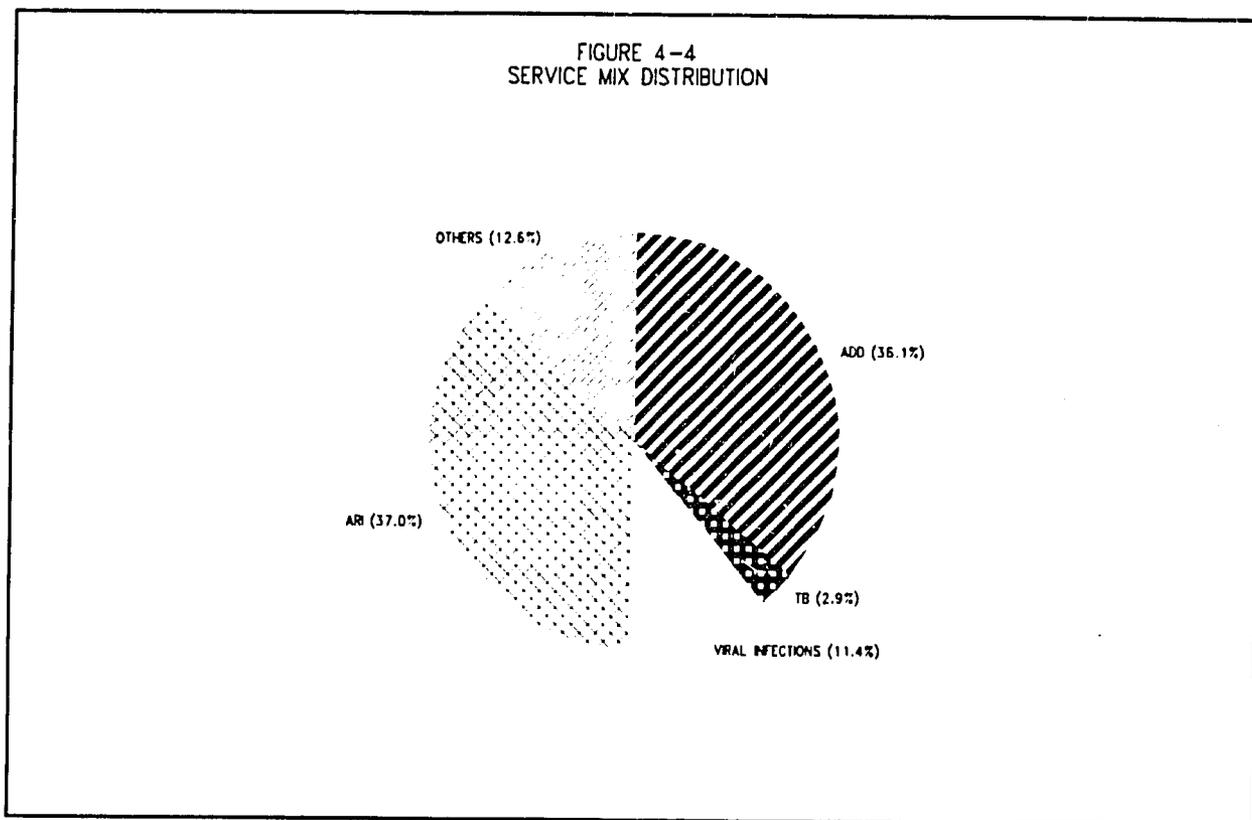
Patient days per month in *Figure 4-2* indicate the same tendency as discharges, with an average of 543 patient days in 1990, increasing by 27 percent in 1991 and dropping to 624 in 1992. The most pronounced variations in patient days per month are found in 1990 and 1991, while 1992 shows the least variation. There appears to be no distinct pattern of seasonal variations. For instance, it could be expected that the winter months of June and July should have a large number of acute respiratory infection (ARI) cases, but the data do not indicate such a pattern.



The relative stability of patient days and discharges are reflected in the average patient stay indicated in *Figure 4-3*. During the three years of the study, the average stay hovered at 10 days, increasing from 9.63 days in 1990 to 10.98 days in 1991, then dropping slightly to 10.85 days in 1992. To determine the reasons for longer patient stays at the Hospital 12 de Abril, analyses were run for continuation rate of services in 1992 and average stay according to pathology.



As shown in *Figure 4-4*, 37 percent of discharges represent patients with ARIs. The second cause of illness is diarrheal diseases, representing 36.1 percent of patient discharges, followed by viral infections at 11.4 percent, and tuberculosis with 2.9 percent. Other non-specified diseases represent 12.6 percent of patient discharges.



The breakdown of ALOS by pathology in *Exhibit 4-1* shows that the dominant activities—ARIs and diarrheal diseases with ALOSs of 9.26 and 8.77 days, respectively—account for most of overall ALOS since the high ALOS for viral infections and tuberculosis are offset by their low incidence.

The average occupancy rate for the five years was 35.9 percent. During 1988-1992, the rate of occupied beds never exceeded 38 percent, reached in 1991; in 1992, the occupancy rate represented only 35 percent of available beds and the bed turnover rate amounted to 11.9 discharges per bed per year.

The hospital has seven full-time and one half-time physician, as well as eight professional and seven auxiliary nurses. In 1992, the hospital provided services for 624 patient days, yielding an index of 12 doctors per 1,000 patient days.

The low occupancy and bed turnover rates partially explain the high ALOS observed at the hospital, since there could be a tendency to keep patients for longer periods than it would normally be required for strict medical reasons. In the words of one physician interviewed: "Since we have the space, we also fulfill our social obligation, allowing the children of poor families to stay at the hospital instead of going to their cramped and cold homes."

**EXHIBIT 4-1**  
**IN-PATIENT DAYS AT HOSPITAL 12 DE ABRIL BY TYPE OF ILLNESS, 1992**

	ACUTE DIARRHEAL DISEASE (ADD)	TUBERCU- LOSIS	VIRAL INFECTIONS	ACUTE RESPIRATORY INFECTION (ARI)	OTHER ILLNESSES	TOTAL
<b>In-Patient Days</b>						
January	119	98	188	97	133	
February	105	72	50	112	11	
March	100	199	30	48	85	
April	171	114	12	96	28	
May	169	169	28	359	54	
June	164	164	43	337	69	
July	253	37	253	161	112	
August	58	0	58	170	43	
September	51	0	51	115	0	
October	41	89	10	180	52	
November	292	47	61	184	41	
December	309	21	25	123	20	
<b>Total</b>	<b>1,832</b>	<b>1,010</b>	<b>809</b>	<b>1,982</b>	<b>648</b>	<b>6,281</b>
<b>Discharges</b>	<b>209</b>	<b>17</b>	<b>66</b>	<b>214</b>	<b>73</b>	<b>579</b>
<b>Average Length of Stay (ALOS)</b>	<b>8.77</b>	<b>59.41</b>	<b>12.26</b>	<b>9.26</b>	<b>8.88</b>	<b>10.85</b>

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The information presented in *Exhibit 4-2* allows comparison of the capacity utilization and the ALOS for the Hospital 12 de Abril with city and national averages. It includes presents average rates of utilization for all hospitals in the CNS in La Paz and hospitals nationwide, including the pediatric hospital Mario Ortiz in Santa Cruz, the second largest city in Bolivia. Notable is the consistently lower occupancy rate of the Hospital 12 de Abril, particularly in contrast to that of the Hospital Mario Ortiz, whose occupancy rate exceeds its La Paz counterpart by almost 50 percent.

*Exhibit 4-2* also displays comparative lengths of stay for the same units. The results indicate definitively that the average stay at the Hospital 12 de Abril for the period 1988-1989 represents almost double the rate of its counterpart, the Hospital Mario Ortiz en Santa Cruz, and is well above the national average. Only in the last two years has the ALOS for the Hospital 12 de Abril reached a level comparable to the other CNS hospitals in La Paz. Although differences in case mix, originating from its specialty character, could partially explain the consistently higher values for ALOS obtained in this study, the hospital authorities should perform a detailed analysis to determine the origins of this behavior.

EXHIBIT 4-2  
COMPARATIVE CAPACITY UTILIZATION, 1988-1991

HOSPITAL	CAPACITY	OCCUPANCY RATE	PATIENT DAYS	DISCHARGES	AVERAGE LENGTH OF STAY (ALOS)
12 de Abril					
1988	21,170	.31	6,649	568	11.71
1989	21,170	.38	8,030	550	14.60
1990	21,170	.31	6,526	678	9.63
1991	21,170	.39	8,334	759	10.98
Mario Ortiz					
1988	8,030	.71	5,689	885	6.43
1989	8,030	.73	5,891	987	5.97
1990	8,030	.78	6,290	1,167	5.39
1991	8,030	.75	6,032	1,301	4.64
CNS La Paz					
1988	NA	.58	NA	NA	10.20
1989	NA	.56	NA	NA	10.20
1990	NA	.54	NA	NA	9.90
1991	NA	.67	NA	NA	12.20
CNA Bolivia					
1988	NA	.44	NA	NA	7.80
1989	NA	.48	NA	NA	7.50
1990	NA	.49	NA	NA	7.20
1991	NA	.59	NA	NA	8.20

20

## **4.2 . COST ANALYSIS**

### **4.2.1 Cost Structure**

The total annual recurrent cost for the 12 de Abril Hospital amounted to Bs. 1,034,465 (US\$328,401 at the December 1992 exchange rate). This cost had the following structure: 78.27 percent personnel; 7.44 percent fixed costs; and 14.29 percent variable costs.

The low values for variable costs can be explained by the low levels of production noted in the previous section, but the exceedingly low level of expenditures in the provision of drugs, 1.8 percent of the total cost, suggest that this item could be under-registered. As noted in the methodology section, the data for the pharmaceutical utilized at the Hospital 12 de Abril were obtained from the registers at the Hospital Obrero, which were incomplete at the time the data was gathered; it is clear that this cost is understated.

The high level of personnel costs reflect a plant of 25 medical and nursing staff supported by 28 administrative personnel. These numbers indicate the hospital's capability to operate their 58 beds at full capacity.

Given the strong leverage that the medical and labor unions have upon decisionmakers at the CNS, the levels of staffing can only increase and, almost certainly, will never go down. Therefore, it is a fairly good assumption to consider personnel costs as fixed in the medium run (three to five years), which implies that any increase in the utilization levels at the hospital clearly will imply equivalent increases in productivity.

### **4.2.2 Unit Cost Analysis**

The procedure for calculating unit costs, described in Section 3.0, includes the classification of all input costs into personnel, fixed, and variable costs, and the calculation of unit costs by dividing the total annual costs by the registered number of patient days.

According to the information in *Exhibit 4-3*, the total cost per patient day was calculated to be Bs. 138 or approximately US\$40 at the 1992 average exchange rate. Seventy-five percent of this cost corresponds to personnel costs and only 14 percent to variable costs. In a recent study prepared by Mother Care for the U.S. Agency for International Development,<sup>1</sup> unit costs were calculated for the services provided by a MPSSP Cochabamba Hospital. The in-patient unit costs for the private ward were the highest at Bs. 121.12, and the general ward's cost was only Bs. 27.22 per patient day. Even before accounting for inflation, at 12 percent per year, the in-patient unit costs at the Hospital 12 de Abril are considerably greater than those at the Cochabamba Hospital.

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<sup>1</sup> Larry Day and Gerry Rosenthal, "Study of the Costs and Cost Recovery Alternatives for Maternal and Neonatal Care Services at the Hospital German Urquidi," Cochabamba, Bolivia. November 1990.

**EXHIBIT 4-3  
IN-PATIENT UNIT COSTS AT HOSPITAL 12 DE ABRIL, 1992**

COSTS	TOTAL (Bs.)
<b>PERSONNEL COSTS</b>	
Health Personnel	506,293.68
Other Personnel	303,443.29
Administration	124,768.29
X-Ray and Laboratory	92,770.29
Food Service	43,821.64
Transportation	6,824.71
Laundry	35,257.86
<b>Total</b>	<b>809,736.97</b>
<b>FIXED COSTS</b>	
Administration	19,889.20
Other	57,062.67
<b>Total</b>	<b>76,951.87</b>
<b>VARIABLE COSTS</b>	
Drugs	18,656.72
Medical Materials	13,280.89
X-Rays and Laboratory	7,027.38
Food Service	80,902.05
Transportation	25,676.61
Laundry	2,232.42
<b>Total</b>	<b>147,951.87</b>
<b>TOTAL COSTS</b>	<b>1,034,464.91</b>
<b>PRODUCTION</b>	
Patient Days (days)	7,497
Capacity (days)	19,800
Capacity Utilization (percent)	.38
<b>UNIT COSTS</b>	
Fixed Unit Costs	10.26
Variable Unit Costs	19.71
Unit Costs without Personnel	29.98
Unit Costs for Personnel	108.01
<b>Total Unit Costs</b>	<b>137.98</b>

The calculated unit cost for the Hospital 12 de Abril is based on 38 percent utilization of the available beds in the hospital. To analyze the impact of increases in the utilization rate, a projection of costs was made according to the following formula:

$$\text{TUC (X)} = ((\text{FC} + \text{PC})/\text{CAP} * \text{X}) + \text{VUC}$$

*where:*

TUC(X) is the total unit cost as a function of capacity utilization

X is the percentage of capacity utilization

FC is the total fixed cost

PC is the total personnel cost

CAP is the total capacity

VUC is the variable unit cost

The results indicate that with an 85 percent utilization rate and keeping the same level of staff, the total unit cost would be reduced to Bs. 72.4 per patient day. The low present utilization level and high fixed personnel costs are principal factors of inefficiency reflected in the high unit cost calculated for the in-patient service at the Hospital 12 de Abril.

## **5.0 COST RECOVERY**

### **5.1 COST RECOVERY ALTERNATIVES**

The results presented in the previous section indicated that the inefficient utilization of resources at the Hospital 12 de Abril had its origin in a combination of fixed levels of personnel and very low numbers of patients served. Given the restrictions in personnel management and the stable number of insured people demanding services, both factors will continue to produce high values of recurrent average costs in the years to come.

To reduce the resource utilization inefficiencies, the CNS could either increase the number of insured people in the system or change its existing service policies to increase present levels of capacity utilization.

During the last few years, the economic restructuring efforts undertaken by the government have caused considerable reductions in formal employment due to the closing of inefficient factories and shops, severely limiting the pool of insured people at the CNS. The slow recovery of the economy and recurrent high unemployment rates seem to indicate that it will be extremely difficult for the CNS to increase its pool of insured members in the years to come.

The existing CNS policies indicate that their health facilities are for the exclusive use of insured members and their families who are to receive services without any additional charges above their monthly dues. To minimize the changes to these policies, alternatives could include expanding the potential customer pool by offering services to persons not covered by the CNS on a fee-for-service basis.

The cost recovery option could be accomplished by either one of the following alternatives:

- ▲ Offer the services on the open market, competing with private hospitals; or
- ▲ Arrive at an agreement with the MPSSP to use the hospital as a more expensive alternative to the crowded Children's Hospital run by the MOH.

To evaluate either alternative, it is necessary to determine what price could be charged for hospital services. A simple model, described below, was developed to evaluate different price options.

### **5.2 INCOME AND COST PROJECTIONS**

Utilizing the previously described cost projection model, income information was added to determine the break-even point as a function of several price alternatives.

The break-even point is defined as the volume of activities at which total income is equal to total costs. Considering that prices only will be charged to the new patients, the break-even analysis is based on the following assumptions:

- (1) Personnel costs are not included since they are and can be covered by the contributions from the insured population.
- (2) The services offered include the provision of drugs and medical supplies.
- (3) The quality of the services offered at the Hospital 12 de Abril is comparable with that of the private sector hospitals that provide similar services at equal prices.

Three prices were analyzed: Bs. 35, 45, and 55 per patient day. For an 80 percent capacity utilization and a price of Bs. 55, there would be an annual surplus of Bs. 146,637 over variable costs and Bs. 69,685 over fixed and variable costs. At a price of Bs. 40, all variable costs would be covered, and at Bs. 21, all additional variable costs produced by the increased utilization would be covered.

If the hospital would charge a price of Bs. 55 per patient day with a utilization level of 42 percent, the projected income would cover the fixed costs. At a level of 60 percent, it would cover all variable costs, and at 70 percent, the income generated would be equal to the sum of the fixed and variable costs, the break-even point.

To assess the feasibility of charging a fee of Bs. 55 per day, this price was compared with some of the prices charged by similar private hospitals and one MPSSP hospital. The results are summarized in *Exhibit 5-1*.

EXHIBIT 5-1 HOSPITAL PRICES (in Bs.)			
HOSPITAL	Price per day room with multiple beds	Price per day medical attention	Total price (without drugs)
12 de Abril			55*
Virgen de Copacabana	35	20	55
Clínica Boston	50	70	120
Adventista	40	45	85
Clínica Mayo	50	50	100
H. Accidentado	30	50	80
Sagrado Corazón	30	50	80
MPSSP Hospital Juan XXIII	11	15	26
* includes drugs			

It is clear that the proposed price of Bs. 55 is considerably lower than the prices charged by all the private hospitals and not too much higher than the price charged at the MPSSP hospital, considering that in the latter, the patient has to purchase all the drugs and disposable medical supplies.

### 5.3 EVALUATION OF ALTERNATIVES

The two alternatives formulated in Section 5.1 were the following:

- (1) Offer the services on the open market, competing with private hospitals; or
- (2) Arrive at an agreement with the MPSSP to use the hospital as a more expensive alternative to the crowded Children's Hospital run by the MOH.

The strengths and weaknesses of each alternative for several criteria are summarized in the *Exhibit 5-2*.

**EXHIBIT 5-2  
EVALUATION OF COST RECOVERY ALTERNATIVES**

CRITERIA	ALTERNATIVE A	ALTERNATIVE B
Financial impact (1)	Bs. 69,685 over fixed and variable costs	Bs. 69,685 over fixed and variable costs
Financial feasibility	Feasible. The price is highly competitive.	Difficult. The price might be above the possibilities of the average MPPSP patient.
Legal feasibility	Feasible	Feasible
Difficulty of implementation	Requires a small marketing effort.	Requires an agreement with the MPSSP and the development of a reference system.
Social impact	Minimal	It would help solve an acute congestion problem at the MPSSP hospital
Image impact	It would induce quality service,(2) improving the CNS external image.	It would show CNS concern for the health of uninsured Bolivians.
Motivational impact	The incentives(2) should increase motivation.	The incentives(2) should increase motivation.
<p>(1) Assuming 80 percent capacity utilization and a price of Bs. 55            (2) Assumes that part of the recovered costs will be distributed to all the hospital's personnel as a production bonus</p>		

An analysis of the strengths and weaknesses of these alternatives was discussed at a workshop of high-level CNS executives, and the results are presented below.

The bottom line of any strategy is the success of its implementation. At this time and without the benefit of a demand study, it is difficult to speculate whether there will be sufficient demand in the private sector to generate the level of capacity utilization needed to sufficiently increase hospital revenues.

The price analysis indicates that the CNS should be able to compete with the private sector. This is only true, however, if the proposed policy is supported by a serious effort to increase and maintain a very high level of quality in the provision of services.

The introduction of a new competitor in the marketplace implies competitive responses, which in turn could change the original assumptions on which the firm entered the field in the first place. This dynamic behavior, which will be new for public sector managers, should be considered to continuously adjust their strategies to fit a rapidly evolving environment.

## 5.4 EVALUATION WORKSHOP

The study results were presented during a half-day meeting held at the office of the medical services manager of the CNS, the agenda of which is in *Exhibit 5-3*.

EXHIBIT 5-3 EVALUATION MEETING AGENDA		
TOPIC	MODE	RESPONSIBLE
Study Objectives and Methodology	Presentation and Discussion	Manuel Olave
Hospital Utilization Results	Presentation	Manuel Olave
Cost Analysis Results	Presentation	Manuel Olave
Production and Costs	Discussion	Dr. G. León
Cost Recovery	Presentation	Manuel Olave
Evaluation of Recovery Alternatives	Discussion	Dr. F. Bedregal
Conclusions	Discussion	Dr. F. Bedregal

The presentation of the objectives and methodology followed closely the information offered in the corresponding sections of this report. There was very little discussion on these subjects, and after a few questions of clarification, it was clear that there was general agreement on the methodology utilized by the research team.

The hospital utilization results caused a great deal of discussion, particularly because of the objections raised by the director and administrator of the Hospital 12 de Abril. The main objections originated in the attempt of the hospital executives to explain the low utilization level and long ALOS found in the study. The principal objections were the following:

- (1) The Hospital 12 de Abril is dedicated to treat children with infectious diseases and that is the reason why the length of stay oscillates around 10 days.
- (2) The length of stay also is affected by social factors since, in a few cases, the parents do not have adequate conditions at home to take care of the children during the convalescence period and the doctors are reluctant to discharge the children under those conditions.
- (3) The comparison with the city and national CNS hospital average lengths of stay overstates the case due to the specific conditions at the Hospital 12 de Abril discussed earlier.
- (4) Since the hospital's main function is exclusively to treat children with advanced infectious diseases, the potential demand of insured children is low, thus explaining the low utilization levels found in the study.

The cost analysis results were accepted without much discussion, and the high unit costs found in the study were believed to be a result of the low utilization levels.

The discussion of cost recovery alternatives was centered on the feasibility of distributing part of the funds recovered to the hospital's personnel. The medical services manager explained that the distribution of recovered funds was accepted as official policy by the MOH, but the social security code would have to be amended to comply with the MOH policy to implement the cost recovery distribution.

The group's consensus was that the best alternative was to offer services on the open market, in competition with the private hospitals, but unless some of the recovered funds were distributed to the hospital staff, cost recovery would fail due to motivation problems.

The conclusions of the workshop and recommendations from the research team are presented next.

## **6.0 CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 CONCLUSIONS**

- (1) The utilization of the unit cost study to evaluate efficiency levels was seen to have paramount importance, and the group felt that this study should be replicated in the principal CNS hospitals in the country.
- (2) The results obtained in the study should be regarded as an indicator of potential areas for improvement rather than as a direct criticism of managerial performance.
- (3) The medical services manager should take the necessary managerial steps to try to modify the Social Security Code to allow the distribution of recovered costs to CNS personnel in accordance with official MOH policy.
- (4) The cost recovery alternative proposed in the study and recommended at the workshop should be processed at the corresponding authority levels.
- (5) The research team should deliver the Spanish version of the report as soon as possible to provide technical support to promote the aforementioned policy changes.

### **6.2 RECOMMENDATIONS**

On the basis of these conclusions and the observations made during the course of the study, the research team suggests the following:

- (1) The annual CNS service statistical report includes some general cost data. Unit cost information calculated with the methodology utilized in this study should be included in the CNS annual report.
- (2) The present study should be replicated for at least one large CNS hospital in La Paz, Cochabamba, and Santa Cruz.
- (3) The cost and utilization data should be processed at the hospital level using inexpensive desktop computers. The current centralized procedure impedes efforts by hospital managers to gain relevant and timely information for decisionmaking.
- (4) The Hospital 12 de Abril should enhance the capabilities of their statistical staff, hiring at least one full-time professional to collect, process, and analyze service statistics and cost information.
- (5) The CNS executives should follow up on the aforementioned conclusions to ensure that a cost recovery system is established at the CNS.

## APPENDIX

### PEOPLE CONTACTED DURING THE STUDY

#### Caja Nacional de Salud

Dr. Fernando Bedregal Barrera, National Departmental Head of Hospitals  
Lic. Antonia Palenque, Accounting Department  
Sra. Consuelo Cervantes, Accounts Payable for Account No. 252  
Sr. Emilio Montero, Responsible for Account No. 122  
Sr. Rodolfo Espejo, Responsible for Account No. 121  
Sra. Susana Delgadillo, Responsible for Account No. 123  
Sr. Wilfredo Hinojosa, Programmer Responsible for Pharmacy Accounts  
Sr. Miguel Patty, Department of Statistics  
Sr. Max Vaca, Review Supervisor  
Sr. Ricardo Yujra, Archivist

#### Hospital 12 de Abril

Dr. Gover León, Director, Hospital 12 de Abril  
Sra. Jenny Imaña Bedregal, Administrator, Hospital 12 de Abril  
Sra. Felicidad Sanguenza, Head of Nursing, Hospital 12 de Abril