# STRENGTHENING THE ECONOMIC-FINANCIAL MANAGEMENT OF THE INTEGRAL HEALTH INSURANCE

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## Mission

The cooperative agreement **Health Systems 20/20** (HS 20/20), funded by the United States Agency for International Development (USAID) for 2006-2011, assists countries who receive USAID support in addressing access barriers to life-saving priority health services. HS 20/20 works to strengthen health systems using an **integrated approach** to improving **financing**, **governance**, **operations**, and **sustainable capacity** of local institutions.

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| Training Resources Group | Tulane University School of Public Health and Tropical Medicine

# AN OBSERVED COSTING METHOD FOR PERU'S INTEGRAL HEALTH INSURANCE: AN APPLIED EXERCISE FOR THREE HEALTH PROBLEMS IN THREE GEOGRAPHIC AREAS

**DISCLAIMER**
The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development (USAID) or the United States Government

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# ACRONYMS

| | |
|---|---|
| **DIRESA** | Regional Health Office |
| **DISA** | Health Office |
| **DRGs** | Diagnosis-Related Groups |
| **HS 20/20** | Health Systems 20/20 |
| **MINSA** | Ministry of Health of Peru |
| **MINSAL** | Ministry of Health of Chile |
| **ODSIS** | Decentralized Office of the Integrated Insurance Program |
| **PRAES** | Promoting Alliances and Strategies Project |
| **SIS** | Integrated Health Insurance Program |
| **USAID** | United States Agency for International Development |

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# EXECUTIVE SUMMARY

Bitrán & Asociados (B&A) has undertaken three studies to provide technical support for Integral Health Insurance (SIS) financial and economic capacity. The goals of the studies were to recommend an observed costing method, propose a new payment system, and present a proposal for the creation of a Financial and Economic Analysis Unit within SIS. This report presents the recommended methodology and results of an applied exercise for the first topic.

Understanding real costs is important for all economic activities and for the health sector in particular. This knowledge is necessary for health planning, budgeting, evaluation, incorporation of new technology, and efficient management of providers. Evaluating real costs as directly as possible is a fundamental task of a public financing agency.

SIS's application of this costing method should serve as the basis for the analysis and eventual selection of payment system. To implement this process, we addressed the following objectives: design an observed costing method for health problems, including the relevant tools; train SIS personnel in these methods and tools to compute observed costs of health problems; carry out a pilot fieldwork study, to verify the services associated with each health problem and to train SIS personnel in the data collection tools; gather the data required for the observed costing study, on three selected health problems in three facilities in three departments of Peru; enter and analyze the information collected by SIS personnel for the costing calculations; and estimate the frequency of health interventions and associated services. Using the data gathered, we then carried out the following additional objectives: perform a costing study of the health interventions, to obtain the unit cost for the set of services associated with the health problem; obtain the prices of medications, supplies, and medical devices associated with the health problem; develop a price vector for the health interventions associated with each health problem; and finally, calculate observed costs.

In the first stage of our technical support we applied an observed costing method to three SIS-covered health problems. The health problems were: Outpatient treatment for acute bronchitis in children, in health posts, health centers, and hospitals; major surgery for cholecystitis in adults, in regional and support hospitals; and outpatient treatment for epilepsy in children, in primary care facilities and hospitals. This project included three health facilities in three geographic regions prioritized by SIS: Amazonas, Huancavelica and La Libertad. The main emphasis was the learning process and transfer of knowledge to SIS personnel. The goal was for SIS to become capable of conducting observed cost studies for the health problems it finances.

We calculated the following observed costs: 1.751 soles for cholecystitis; 66 soles for epilepsy in children (including exams and medications); and 29 soles for acute bronchitis in children (mainly medical exams and medications). For cholecystectomy, there were significant differences across facilities for bed-day and exam costs. These services are probably undervalued as they were measured only in a hospital (La Libertad teaching hospital). It was not possible to impute the building costs (depreciation) as we lacked reliable data on their residual value.

For epilepsy, some consults required complex, high-cost exams (such as electroencephalography), and others required none. For bronchitis, exams were not costed, in some cases because they were not well reported; in others because there were no or few exams were sampled.

In terms of cost component distribution, the most intensive human resources use was for bronchitis. For this health problem, medications accounted for the largest percentage of cost, followed by human resources, then depreciation of equipment and materials, and finally general expenses. For childhood epilepsy, exams were the most costly, followed by medications, human resources, general expenses, and finally depreciation of materials and equipment. For the surgical intervention, conventional cholecystectomy in adults, the greatest expense was hospital bed-days, then medications, followed closely by human resources, then depreciation of equipment and materials, and finally general expenses.

Our findings indicate that SIS standard costs are fairly close to actual costs for acute bronchitis in children, with the caveat that our sample included practically no exams. On the other hand, for childhood epilepsy, SIS transfers fail to cover a significant portion of observed costs. However, if exams are excluded, the standard and observed costs are similar. These two cases indicate, then, that SIS covers the costs of medications and supplies but not exams. Finally, for cholecystectomy, in which variable costs accounted for the largest percentage of the total, SIS transfers are undervalued.

Experience with this study yielded a number of lessons learned regarding the observed costing process. First, it is important to develop a prior consensus on technical definitions and other issues regarding the health problems to be costed, including diagnosis, treatment, and follow-up. Second, a successful study will require significant time in the field, gathering data from facilities. Third, because union and political movements can jeopardize data acquisition, fieldwork should be planned for periods of relative calm. Fourth, supervision during fieldwork is crucial, for dealing with unexpected problems or unfamiliar data management systems. Finally, obtaining reliable central data, such as medication and equipment prices or cost of buildings, conserves fieldwork efforts.

SIS will need to perform a large costing study in preparation for adjusting their payment system. We recommend that SIS begin with priority primary care services and move on to hospital services at a later stage. It is vital that the sample size, while remaining feasible for data collection, is large enough to be representative of the country's health system.

# 1. INTRODUCTION

## 1.1 GENERAL BACKGROUND

Health Systems 20/20 is a five-year (2006-2011) cooperative agreement funded by the United States Agency for International Development (USAID). The project provides technical support to countries who receive USAID support, to address issues with governance, financing, operations, and technical capacity within the health sector. HS 20/20 works to strengthen health systems in developing countries to facilitate their population's access to life-saving priority health and nutrition services.

HS 20/20 focuses on developing technical capacity to support sustainable, long-range health system growth. The project provides leadership, technical assistance, research, professional networks, and information.

Abt Associates leads the project's collaborators, including the Aga Khan Foundation, BearingPoint, Bitrán & Asociados, BRAC University, Broad Branch Associates, Forum One Communications, RTI International, Training Resources Group and Tulane University School of Public Health.

The guiding principles of the HS 20/20 project are:

- Promote institutionalization;
- Seek out and promote collaboration and strategic partnerships;
- Build on existing knowledge and focus on the concept of "better purchasing," using an evaluation-based approach;
- Optimize intersectoral focus;
- Make decentralization work;
- Partner with the private sector;
- Develop solutions to reconstruct, develop, and transform governments;
- Reach out to the poor;
- Support developing countries' acquisition of knowledge, capacity, and tools; and
- Exploit technological innovation for information and communication systems

The Integral Health Insurance (SIS) is a decentralized public organism within the Peruvian Ministry of Health (MINSA). Its mission is to provide for the health of persons without insurance, prioritizing vulnerable populations in situations of poverty and extreme poverty.

SIS emerged from the fusion of the Free Student Health Insurance program and the Maternal and Child Health Insurance program for expectant mothers and children under the age of 5. The programs merged in 2001and became SIS. The entity was legally formalized in January 2002.

Since its inception within the context of the reform, SIS has focused on addressing the target population's limited access to health services due to economic, cultural and geographic barriers. Furthermore, SIS is responsible for financing individual health services. To this end, SIS seeks to improve efficiency in allocation of public resources. However, SIS currently administers only a part of the resources not associated with human resources. It is hoped that in coming years the amounts will increase significantly.

In this context, Health Systems 20/20 (HS 20/20) has undertaken three projects to provide technical support for SIS's financial and economic capacity. The goals of the projects were to recommend an observed costing method, propose a new payment system, and present a proposal for a Financial and Economic Analysis Unit within SIS. This report presents the recommended method and results of an applied exercise for the first topic.

The first goal of the proposed costing method is to evaluate SIS's provider payments in relation to provider costs for covered services. To facilitate SIS personnel's assimilation of the suggested concepts, we decided to apply the chosen method to three health services at three levels of care. SIS selected the following services: Outpatient treatment for acute bronchitis in children, in health posts, health centers, and hospitals; hospital admission with major surgery for cholecystitis in adults, in regional hospitals and in support hospitals; and outpatient treatment for epilepsy in children, in primary care facilities and hospitals. This project included three health facilities in three geographic regions prioritized by SIS: Amazonas, Huancavelica and La Libertad. The main emphasis was the learning process and transfer of knowledge to SIS personnel.

## 1.2 OBSERVED VERSUS STANDARD COSTS

Costing studies are important in countries that prioritize health problems. There are two main types of costing. The type usually performed first is standard costing. This process is used to budget the prioritized health interventions. The second type, usually performed later, is observed costing, to adjust planning and fee schedules.

Peru has experience with standard costing, used to calculate the average cost of producing a health service under conditions defined ex-ante as efficient and compliant with quality standards. Standard costs are useful as indices to compare among homogenous or similar facilities. They also allow the administration to estimate the total cost of a set of prioritized health problems. This result allows them to estimate the budget needed and make decisions regarding conditions to include in a package.

However, standard costs can be significantly different from observed costs. Observed costs are the real cost incurred. Understanding real costs is important for all economic activities and for the health sector in particular. This knowledge is necessary for health planning, budgeting, evaluation, incorporation of new technology, and efficient management of providers. Evaluating real costs as directly as possible is a fundamental task of a public financing agency.

**TABLE 1: TWO COST ESTIMATION METHODS**

| | Standard costing methodology | Observed costing methodology |
|---|---|---|
| Use of protocols | Pre-defined by central technical agency | Verified in the field, what is actually being done is costed |
| Information requirements | Aggregated at the "central level" | Gathered in the field based on a sample |
| Computation process | In office, with estimates of national averages (or sampled) | Requires a tool to gather data in the field, and computations are based on this data |
| Results | Average national costs (or of the selected group) | Unit costs for each element of the sample, allows for computations of central trends and variations for the sample |

*Source:* Authors.

In practice, the two methods are generally combined in some way. For example, a system may use observed costing to calculate direct costs and standard costing to estimate indirect costs where cost accounting systems are homogenous.

## 1.3 STRUCTURE OF THIS REPORT

Following this introduction, Section 2 presents this study's general and specific objectives. The general objective explains the main purpose of the exercise, while the specific objectives explain each of the steps to be carried out in the exercise.

Section 3 describes the methodology used, including the preparation, definition, and design of the tools, fieldwork, and calculations performed using the data collected.

Section 4 presents the results of the costing calculations, including average cost by health problem and facility. We then evaluate any gaps between observed costs and actual SIS transfers intended to cover the health problems.

The final section presents conclusions and lessons learned from the analysis. This section focuses more on the processes than the numerical results.

# 2. OBJECTIVES OF THIS REPORT

## 2.1 GENERAL OBJECTIVES OF COSTING STUDY

The objective of this study was to develop an observed costing method that SIS could apply to the health services it finances. To facilitate transfer of knowledge, SIS personnel would assist in performing an observed costing exercise for 3 health problems at different levels of care in 3 departments of Peru. SIS could then use this method as a basis for analyzing and adjusting its fee and payment system.

## 2.2 SPECIFIC OBJECTIVES

The specific objectives are the following:

- Design an observed health problem costing method and associated tools;
- Train SIS personnel in methods and tools required for observed health problem costing, to transfer technical knowledge
- Carry out a pilot study to collect field data, verify the services associated with each health problem, and train SIS personnel in the data collection tools
- Gather the data required for the observed costing study on three selected health problems, in three facilities and three departments of Peru
- Enter and analyze the information collected by SIS personnel for the costing calculations
- Using the data collected, estimate the frequency of health interventions and associated services
- Using the data collected, perform a costing study of the health interventions to obtain the unit cost for the set of services identified for the health problem
- Obtain the prices of medications, supplies, and medical devices associated with the health problem
- Develop a price vector for the health interventions for each health problem
- Compute observed costs for the three health problems

# 3. METHODOLOGY

## 3.1 ORGANIZATION OF STUDY

The study was organized into 3 stages associated with the 10 specific objectives.

**TABLE 2: SPECIFIC OBJECTIVES AND CORRESPONDING PROJECT STAGES**

| Specific objective | Stage |
|---|---|
| SO1 | Stage 1: Design methods and tools |
| SO2 | Stage 1: Train SIS personnel |
| SO3 | Stage 1: Pilot study in Lima |
| SO4 | Stage 2: Gather data in selected departments |
| SO5 | Stage 2: Enter and analyze data |
| SO6 | Stage 3: Estimate frequency of services associated with each health problem |
| SO7 | Stage 3: Obtain costs of services associated with each health problem |
| SO8 | Stage 3: Obtain prices of medications, supplies, and medical devices for each health problem |
| SO9 | Stage3: Develop a price vector for each health problem |
| SO10 | Stage 3: Calculate observed cost of 3 health problems |

*Source:* Authors.

### 3.1.1 SUMMARY OF STAGES COMPLETED

Below we provide an overview of the study's main stages.

We completed the training and collection of primary and secondary data in stages 1 and 2, and most of the data processing in stage 3. A large portion of the study's timeline was dedicated to training and collecting primary data. Therefore, we developed a strategy for finalizing stages 1 and 2 as quickly as possible. The work plan for the fieldwork was as follows:

**Stage 1: Pilot study and training**: The first stage was devoted to training SIS personnel in the methods to be used. To this end, we conducted a pilot study using the interview tool. The pilot sampled 3 facilities in Lima, one for each health problem and level of care. We collected exhaustive information on the services and utilization frequencies associated with the health problem, as well as cost data on a tentative list of services. This stage had two objectives: to carry out effective training with the designated SIS work team, and to test and correct the interview tool to be used in the definitive study.

Based on results from Stage 1 and information provided by SIS, we refined the planned definitive study, including the list of services to be costed for each health problem. These steps correspond to SO 1, SO 2, and SO 3.

**Stage 2: Data collection in the field**: In the second stage, we visited the facilities selected for our sample. We gathered data for all the health services and interventions selected based on data from Stage 1and SIS.

To characterize the care process for the health problems identified, we verified the model of care, associated services, and utilization frequencies with the facilities, including all relevant levels of care.

**Stage 3: Computations and final estimates using the inputs from stages 1 and 2**. Results from Stage 2 provided a set of health interventions and services for the selected health problems, specifying the services making up each intervention and their respective frequencies. It also provided the unit costs of each service. Finally, it provided the frequency of each health intervention. The final Stage provides the average cost of each health intervention, and the product of both inputs (frequency and cost of each service) yielded the total cost for each health problem.

## Sample

The departments selected for data collection were the following:

- Huancavelica
- La Libertad
- Amazonas

The pathologies or health problems and associated health care services to cost were the following:

- Acute bronchitis in children (outpatient treatment). CIE 10 codes associated with the health problem: J20, J40, J41 and J42. SIS code associated with the health problem: 451
- Surgery for cholecystitis in adults (hospitalization with major surgery). CIE 10 codes associated with the health problem: K80 and K81. SIS code associated with the health problem: 462.
- Childhood epilepsy (outpatient treatment). CIE 10 codes associated with the health problem: G40 and G41. SIS code associated with the health problem: 451

The above is summarized in the following table:

**TABLE 3: SUMMARY OF PILOT STUDY PLAN**

| | Type of facility | | |
|---|---|---|---|
| | Type III | Type II | Type I |
| Pilot | | | |
| Lima | Children's Health Institute (1,2,3)<br>Cayetano Heredia National Hospital (1,2,3) | San José Hospital (1,3) | Mirones Health Center |
| Region | | | |
| Amazonas | | Virgen de Fátima Regional Hospital(1,2,3) | Pedro Ruiz Gallo Health Center<br>Luya Health Center |
| Huancavelica | | Huancavelica Departmental Hospital (1,2,3) | Castrovirreyna Health Center (1)<br>Ascensión Health Center (1) |
| La Libertad | Belén Hospital (1,2,3)<br>Regional Teaching Hospital (1,2,3) | Chepén Support Hospital (1) | |

Note: The health problems to be costed for each facility are in parentheses:
1: Acute bronchitis;
2: Epilepsy
3: Cholecystitis.
*Source:* Developed by HS 20/20 in conjunction with SIS staff.

Below we explain the three stages in detail.

## 3.2 STAGE 1: DESIGN OF METHODS AND TOOLS

### 3.2.1 DEFINITIONS

First, we will define the basic terms used in this study:

**Health problem**: Set of health interventions to resolve a pathology or health condition.

**Health intervention (HI)**. A set of health services.

**Service**. A component of a health intervention. A health intervention can include one or many services. Most services have a code in the SIS fee schedule. Medications, lab exams, imaging studies, and diagnostic and/or therapeutic procedures are considered services. The following are examples of services:

- Blood type and RH exam (lab exam)
- Ultrasound (imaging study)
- Amniocentesis (diagnostic procedure)
- Blood transfusion (therapeutic procedure)
- Bed-day

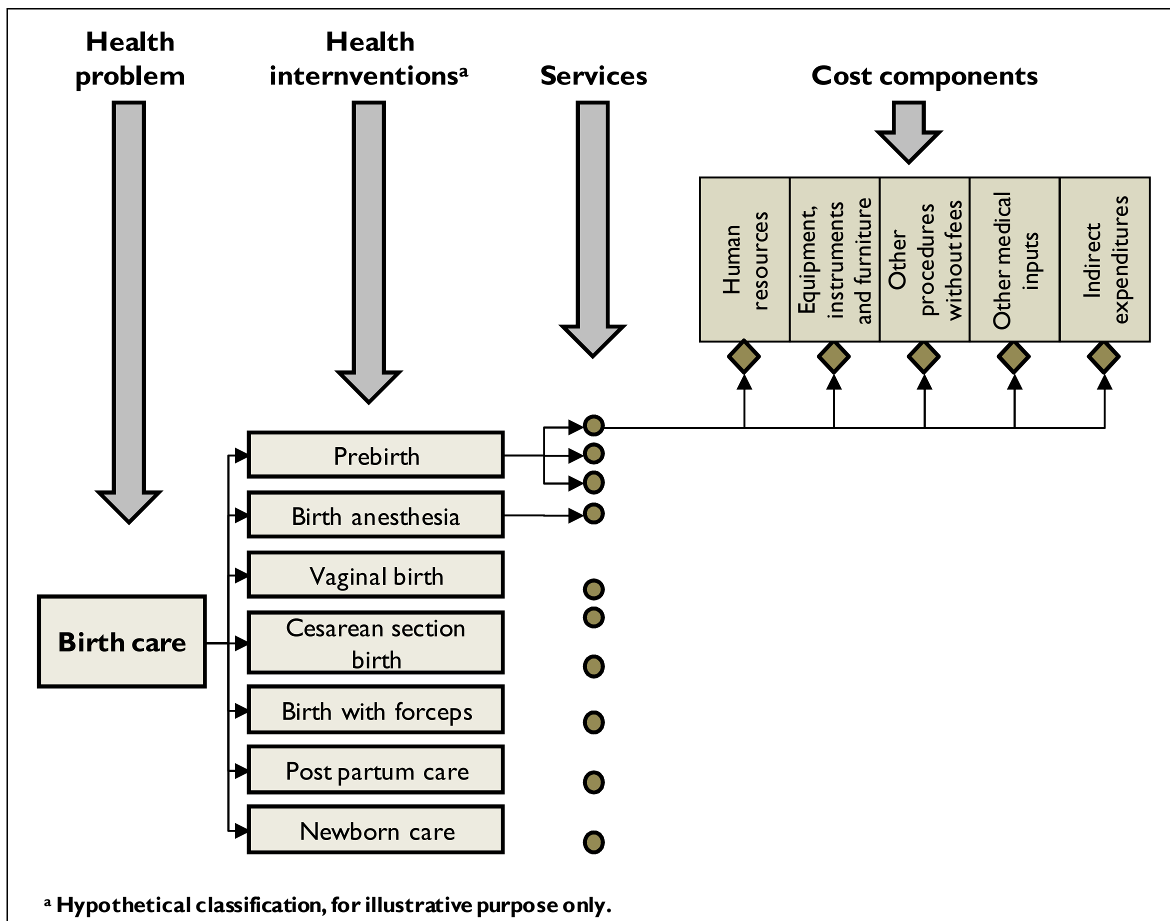
- Surgical intervention
- Physician consult or other professional consult

**Cost component**. One of the elements contributing to the cost of a service. A service generally has several cost components. The following are examples of cost components:

- Direct labor (professional and non-professional)
- Instruments
- Equipment
- Supplies
- Indirect costs (including administration and basic services)

As an example, Figure 1 presents a scheme of how the health problem Birth Delivery Care relates to its potential HI, services associated with the HI, and cost components of each service. This is a complex example that provides a good illustration of the above definitions.

**FIGURE 1: EXAMPLE OF A HEALTH PROBLEM AND RELATIONSHIP AMONG ASSOCIATED COST ELEMENTS**




[a] Hypothetical classification, for illustrative purpose only.

*Source:* Bitrán & Asociados.

### 3.2.2 GENERAL SAMPLE

We selected the health interventions and associated services for the three health problems based on our analysis of actual clinical practice. To establish actual practice, we used normative data from SIS, and then verified it in the field during the pilot study in Lima. That is, during the pilot study, we verified the productive process used to address each of the three selected health problems.

For the definitive study, we selected a sample stratified over three priority geographic zones in order to capture the variability within the sector, effectively characterize the different types of care, and define specific services for each type.

Finally, our chosen sample consisted of 20 randomly selected case histories for each health problem from each facility selected, resulting in about 320 case histories.[1]

We expected that the greatest variability would be between rather than within facilities. Therefore, to capture the inter-hospital (or inter-health center) variability, it would have been beneficial to include the largest possible number of facilities in our sample. Our sample size was limited by the scope of the study. However, while this is a technical limitation, it did not stand in the way of our main objective, which was to transfer technical capacity to SIS personnel. Even with our limitations, we were able to include a sample of 9 health facilities.[2]

SIS selected the health problems according to the following criteria:

- Appropriate for limited scope of the project
- Relatively high frequency within Peru/SIS
- Apparent gap between SIS fee and facility costs

SIS selected the regions according to regional representativeness (coast, mountains, and forest) and the presence of the Promoting Alliances and Strategies project (PRAES), to enhance global management capacity. SIS selected specific facilities based on their provision of the selected health interventions and attempted to include all levels of care.

Although SIS only covers the variable costs of care, we jointly decided to estimate total costs for the visits and surgery. Our reasoning was as follows:

1. While today SIS's role is to administer a subsidy, its financial vocation is growing as its role as sector financer expands
2. Economies of scale may be overlooked if calculations are disconnected
3. The marginal cost of gathering the necessary data once in the field was practically null; and
4. To analyze the relative weight of each problem, we would need total costs

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[1] As shown in the results, during the fieldwork we were not actually able to obtain information from the entire sample selected.

[2] However, as explained below, we were only able to gather data from 6.

**TABLE 4: RANKING OF SELECTED PROBLEMS AMONG 7 MILLION SIS-FINANCED SERVICES IN 2006**

| Position | ICD-10 | Description | Frequency |
|---|---|---|---|
| 1 | J00X | Acute nasopharyngitis [common cold] | 7.59% |
| 2 | Z001 | Encounter for routine child health examination | 7.41% |
| 3 | J029 | Acute pharyngitis, unspecified | 6.86% |
| 4 | Z349 | Encounter for supervision of normal pregnancy, unspecified | 5.99% |
| 5 | J209 | Acute bronchitis, unspecified | 4.43% |
| 6 | J039 | Acute tonsillitis, unspecified | 3.63% |
| … | … | … | … |
| 40 | B369 | Superficial mycosis, unspecified | 0.48% |
| 41 | J208 | Acute bronchitis due to other specified organisms | 0.47% |
| 42 | Z271 | Need of immunization against DPT | 0.47% |
| … | … | … | … |
| 87 | G442 | Tension-type headache | 0.14% |
| 88 | J202 | Acute bronchitis due to streptococcus | 0.14% |
| 89 | B49X | Unspecified mycosis | 0.14% |
| … | … | … | … |
| 128 | B778 | Ascariasis with other complications | 0.08% |
| 129 | J40X | Bronchitis, not specified as acute or chronic | 0.08% |
| 130 | E611 | Iron deficiency | 0.08% |
| … | … | … | … |
| 136 | S018 | | 0.07% |
| 137 | G409 | Epilepsy, unspecified | 0.07% |
| 138 | B353 | Tinea pedis | 0.07% |
| … | … | … | … |
| 396 | Q658 | Other congenital deformities of hip | 0.01% |
| 397 | J200 | Acute bronchitis due to Mycoplasma pneumoniae | 0.01% |
| 398 | O828 | Other unique cesarean delivery | 0.01% |
| … | … | … | … |
| 439 | Z258 | Acute vulvitis | 0.01% |
| 440 | J42X | Unspecified chronic bronchitis | 0.01% |
| 441 | S524 | Fracture of shaft of radius | 0.01% |
| … | … | … | … |
| 544 | J129 | Viral pneumonia, unspecified | 0.01% |
| 545 | K800 | Calculus of gallbladder with acute cholecystitis | 0.01% |
| 546 | P209 | Intrauterine hypoxia, unspecified | 0.01% |
| … | … | … | … |

*Source:* Based on SIS data, 2006.

As shown in Table 4, bronchitis was the fifth-most frequent diagnosis for SIS services, with related codes appearing lower on the list (numbers 41 and 88, for example). Epilepsy was ranked at number 137, and cholecystitis at number 545. Out of a total of 7 million services and about 5000 diagnoses, these figures indicate that these are common health problems.

### 3.2.3 VERIFICATION OF SELECTED INTERVENTIONS

Our team worked with relevant personnel in the field (clinical service managers, facility administrators, and others) to gather the following information regarding the selected interventions:

- Care process
- Distribution of the relevant work among professionals
- Existence of norms, protocols, and care paths
- Types of medications, supplies, and medical equipment used
- Exams and procedures used

SIS personnel carried out the fieldwork, with the support of DIRESA personnel in two of the three cases, who in turn received training from HS 20/20 in the following areas:

- General aspects of the study: context, objectives, methods, facilities to be sampled, etc.
- Costing method
- Tools selected and relevant details
- Administrative aspects of project
- Project timeline
- Support for fieldwork
- Review and delivery of fieldwork materials

The fieldwork consisted of: i) reviewing the selected case histories; ii) guided visits to facilities, and interviews with facility staff. A single interview tool was used to gather the following data:

- General information on the facility and the patients sampled
- Health intervention and services composing each health problem
- Hospital bed-days by type of bed (integrated vs. standard, intermediate, intensive care), for cholecystitis
- List of medications used with dosage, where applicable
- List of supplies used, where applicable
- Type and frequency of lab exams, where applicable
- Type and frequency of imaging studies, where applicable
- Diagnostic and therapeutic procedures, where applicable
- Supplies, equipment, and work area within the building used

We developed the final tool based on findings from Stage 1 (pilot study in Lima). The tool was designed to cover the main aspects of the facility's structure, the processes involved in delivering the relevant clinical services, an exhaustive list of services associated with the selected cases, and the frequency or dosage of each service. The tool is described in detail in the Appendix.

### 3.2.4 FREQUENCY OF SERVICES WITHIN HEALTH INTERVENTIONS

After concluding the fieldwork, we sorted the data according to actual frequency of services. We created a table with a row for each observed service and a column for each type of facility. The cells contained the observed frequency of the service for each type of facility.

We expected frequency to vary by facility, with lower variance among similar facilities than facilities of different types. For example, we would expect that national hospitals provide complete blood counts at a similar frequency, with little variation across facilities. However, it is probable that complete blood counts are performed at different frequencies at regional vs. support hospitals.

To calculate the frequency of each service for each type of facility, we used a weighted average. The weight was the volume produced by each type of facility during the reference period.

We examined the distribution or variance of the frequencies in each table and for each service. The above calculations could be used to propose a normative frequency, with input from experts.[3]

## 3.3 STAGE 2: PREPARATION AND PILOT STUDY

To facilitate transfer of knowledge on observed costing, a team of SIS interviewers was selected. HS 20/20 trained and supervised the team during the data collection stage.

### 3.3.1 TRAINING

SIS personnel met in Lima for a week of training. The training included three parts:

- First, the HS 20/20 technical team presented and discussed the general methods for the costing study
- Second, we provided background on the theoretical basis of the project
- Third, we carried out a pilot study to test the tools, train the interviewers, and gather information to complement existing SIS data on processes used in health interventions for the three pathologies

### 3.3.2 PILOT STUDY

We performed a pilot study to test the tools, train the interviewers, and gather information about the system. We selected Lima facilities not associated with the final study that provide care for the three chosen health problems.

First, it was necessary to coordinate with and secure the support of MINSA and the Regional Health Offices (DIRESAs) in the pilot and definitive study regions. Later, DIRESA personnel collaborated with SIS in gathering data.

HS 20/20 presented the costing method to SIS. SIS staff participated (as chosen by SIS), including professionals and interviewers (from ODSIS), and representatives from MINSA and the DIRESAs were

[3] We did not carry out this step at this time.

invited.[4] The SIS interviewers collaborated in the theoretical work, so that they would be familiar with the survey methods and instruments for the fieldwork.

We performed a pilot study using the tools we designed, using the interview tool in three Lima facilities (one for each problem to be costed). Afterwards, we made a preliminary evaluation and finalized the tools for the definitive project in the areas selected: La Libertad, Huancavelica and Amazonas.

SIS selected the following facilities for the pilot study:

- Lima: Children's Institute: Major Surgery Service 462
- Cayetano Heredia National Hospital: Emergency Service 459
- Mirones Health Center: Outpatient Service 457

However, for various reasons, including the medical workers strike, we visited: National Hospital Cayetano Heredia's emergency room, laboratories, radiology, and pediatric neurology departments; and San José de Callao Hospital, where we reviewed case histories for the three pathologies.

## 3.4 STAGE 3: ESTIMATIONS OF OBSERVED COSTS

This stage followed the data collection and entry. We used the data to calculate observed costs of the three health problems.

### 3.4.1 OBJECTIVES OF THIS STAGE

The focus of this stage was to estimate the costs for the specific services associated with the selected health problems. This included calculating frequency and costs for each of the health interventions or services composing the health problem to be costed.

The following 4 elements are used to estimate demand for treatment of a given health problem:

- Real need (medically determined)
- Perceived need (determined individually)
- Demand for care
- Service utilization

In general, the figures decrease from the first to the fourth concept.

Another step within this stage was to determine the service utilization rate necessary to delivery care for the selected health problems. We gathered this information in the field using tools designed for this purpose.

[4] The MINSA staff did not attend. Two DIRESAs participated: Amazonas and La Libertad.

### 3.4.2 COSTS OF SERVICES

During this stage, we focused on estimating costs exclusively for the services associated with the selected health problems. We performed these calculations using the data collected in the field. The data collection tools were: a structured interview with key informants in each of the sampled facilities; direct observation via a guided visit; and transcriptions of facility and SIS records, including case histories.

There are two methods to calculate costs: bottom-up and top-down. The top-down method seeks to determine the average production cost of a health service, dividing total spending for a health service by its production. The bottom-up method seeks to determine the unit cost of producing a health service, including all supplies required, their utilization intensity, and their prices. Table 5 shows the advantages and disadvantages of the two costing methods. We used the bottom-up approach for direct costs and the top-down approach for indirect costs.

**TABLE 5: ADVANTAGES AND DISADVANTAGES OF COSTING METHODS**

| Costing method | Advantages | Disadvantages |
|---|---|---|
| Top-down | Allows for costing large productive groups: bed-days, outpatient treatment<br>Incorporates all recurrent expenses for a facility, without having to enter each detail of each input used<br>Less costly | Unless the facility has accounting systems with detailed cost centers, cannot distinguish the costs of very specific services, such as upper ARI from lower ARI |
| Bottom-up | Allows for costing specific services<br>More precise | Does not allow for measurement of shared resources<br>More costly |

*Source:* Authors.

Our objective was to determine the direct and indirect costs of the selected services using empirical data from our sample of facilities. Below is a series of relevant definitions:

**Direct costs**. These are the direct costs of a service, with no ambiguity regarding the link between the service and the expense. Direct costs include direct labor, medical supplies, medications, and equipment consumed in the provision of a service. They also include depreciation of fixed activities, such as equipment, buildings, instruments, and furniture used directly in the provision of the service.

- **Direct labor**. This cost includes all personnel, both health care providers and administrative support, who intervene directly in producing a service in a given cost center. To calculate the cost of direct labor, we must identify categories of personnel who intervene in the productive process as well as the time allocated to the process. This last parameter is the technical coefficient of the productive factor. We obtain this figure by using a weighted average of the per-hour value of each category of personnel.
- **Goods and services consumed**. This cost includes the goods and services used in the production process for services at a given cost center. According to

our costing method, expenditures from productive cost centers are considered part of the direct costs of a service, including: medication, surgical and dental supplies, medical materials, surgical materials and tools, chemical products, and others. The cost of these inputs is calculated using the same procedure as for direct labor. That is, we identify the technical coefficient (utilization rate of the productive factor) of the input (Q) and its unit price (P). The product of these two factors is the unit cost (C). The formula is C = PxQ.

To identify these direct costs, we planned to observe the services during guided visits with the technical personnel responsible for providing the service, using a data collection form for direct costs. The unit costs associated with each good and service consumed were extracted from the facility's data management systems, where available. In cases for which it was not possible to identify the price of each good and service consumed, we planned to use the following sources to estimate prices:

- SIS prices
- Central purchasing center prices
- Prices in other facilities that did have available information
- **Direct use equipment, instruments, and furniture**. These are the costs associated with depreciation. Our calculations included all elements available in the location in which the service is provided. As they are valued at the cost of replacing the item, we used market prices for the moment at which the costing took place. To obtain the annual depreciation cost, we divided the price of the item by its useful life, and then divided the result by the number of services provided over the period to obtain the cost associated with producing the service. As with goods and services consumed, we planned to extract the unit costs for direct-use equipment, instruments, and furniture from the facility's data management systems. These were expected to vary by center given the heterogeneity of the sample.
- Although we presumed that most facilities sampled would have price records for their inventories, prior experience with this type of study indicates that these databases are often incomplete or out of date. Therefore, where it was not possible to identify the price or useful life of equipment, instruments, or furniture, we recurred to the three information sources noted.
- We set a standard useful life of 10 years for equipment and furniture. For surgical instruments, we set a useful life of 3 years. However, this was subject to adjustment after observation in the field.

**Indirect costs**. These are costs related the given service that are not directly measureable and/or easily associable with the service. To calculate indirect costs we must first identify the production center or cost center where the services are produced or expenditure items distributed. Information sources for indirect expenses vary by facility. Our prior experience has suggested that the quality of data management systems varies significantly among facilities as well. During our pilot study, we verified the quality of the available data and feasibility of using the data for our study.

In facilities that lacked data management systems or other appropriate systems for estimating costs, the consulting team adopted alternative methods for imputing indirect costs.

We excluded indirect costs for those expenditures already included under direct costs, such as the value of direct labor in the cost center, clinical supplies, and medications. Indirect costs have two sources:

- All direct expenditure items in a cost center that are not direct human resources, medications, clinical supplies, or depreciation of equipment.
- Expenditures on non-productive or support units or centers, whose expenditures are assigned to the cost center that generates billable products

In general, indirect costs are associated with the following cost centers: Administration, daycare, general maintenance, repairs, transport, laundry and linens, nutrition, pharmacy, sterilization, admitting, and records. These cost centers include expenditures for human resources and supplies, such as meals for patients and staff, fixtures, scrubs, laundry items, fuel and lubricants for vehicles, maintenance and repairs, office supplies and equipment, computer expenses, electricity, potable water, gas, telephones, heating, transport of referred patients and family members, services, general expenses, and other expenses.

We estimated indirect costs for each service according to the following method:

- For each service in each facility sampled, we identified the cost center for the expense
- We labeled the total expense the recurrent expense for the cost center
- In each cost center, we identified the portions of the expense directly associated with human resources, goods and services. We also identified the portions associated directly with purchase of equipment, furniture, and instruments, including repair and maintenance services. We labeled the sum of these expenses the direct recurrent expense for the cost center.
- We labeled the difference between the recurrent total and direct recurrent expense the indirect recurrent expense for the cost center.
- We estimated the quotient between the indirect recurrent expense and the direct recurrent expense for the cost center. We applied this quotient to the estimated direct cost of a service to obtain the indirect cost.

**Cost of services**. The fieldwork provided data on utilization rate or intensity of each service within a set of facilities, by cost component. Cost components include intensity of labor utilization (for example: physicians, nurses, nursing assistants); depreciation of equipment (for example: stretchers), instruments, and furniture; and medical supplies (for example: solutions, sutures). We then multiplied the intensity or quantity of components by the respective unit costs, and summed the costs for each service. This calculation provided an estimate of the total direct costs of this service for this hospital. We added the indirect costs, estimated according to the above explanation. As a result, we obtained the total observed cost for each service in each facility sampled. Then, for each service, we could calculate a simple average cost across the sampled facilities.[5]

[5] More details on this point are provided in the Appendix

### 3.4.3 ANALYSIS OF COST INFORMATION

After gathering the data from the facilities, we were able to estimate direct and indirect unit costs for each service associated with each type of health problem.

It should be noted that the results only represent these facilities. In extrapolating from these findings, it is important to keep this limitation in mind.

The calculated unit cost (average cost) of the services depended on the type of facility. Because several types of facility were chosen for each service, we needed to calculate the unit cost within each type of facility (for example, the average cost of a complete blood count in a regional hospital).

Because the volume of each type of service was similar within each facility, it was not necessary to weight the unit costs by volume.

As expected, unit costs varied by type of facility, for example regional facilities vs. national hospitals. The degree of variation was analyzed, and the team decided whether to preserve the variability or eliminate the variability from the costing process, by calculating a figure representative of the average cost of each service for all types of hospitals (for example, a single unit cost for a blood count for the all hospitals, of any type).

### 3.4.4 RELEVANT PRICES FOR MEDICATIONS, SUPPLIES, AND MEDICAL EQUIPMENT

We planned to obtain the relevant prices for medications and supplies during our fieldwork, via oral responses or facility records. However, as this was not possible, we obtained the data via central records from the SIS database containing prices of medication, supplies, and medical equipment. We used these data to impute the relevant prices.

### 3.4.5 PRICE VECTORS AND CALCULATION OF OBSERVED COSTS

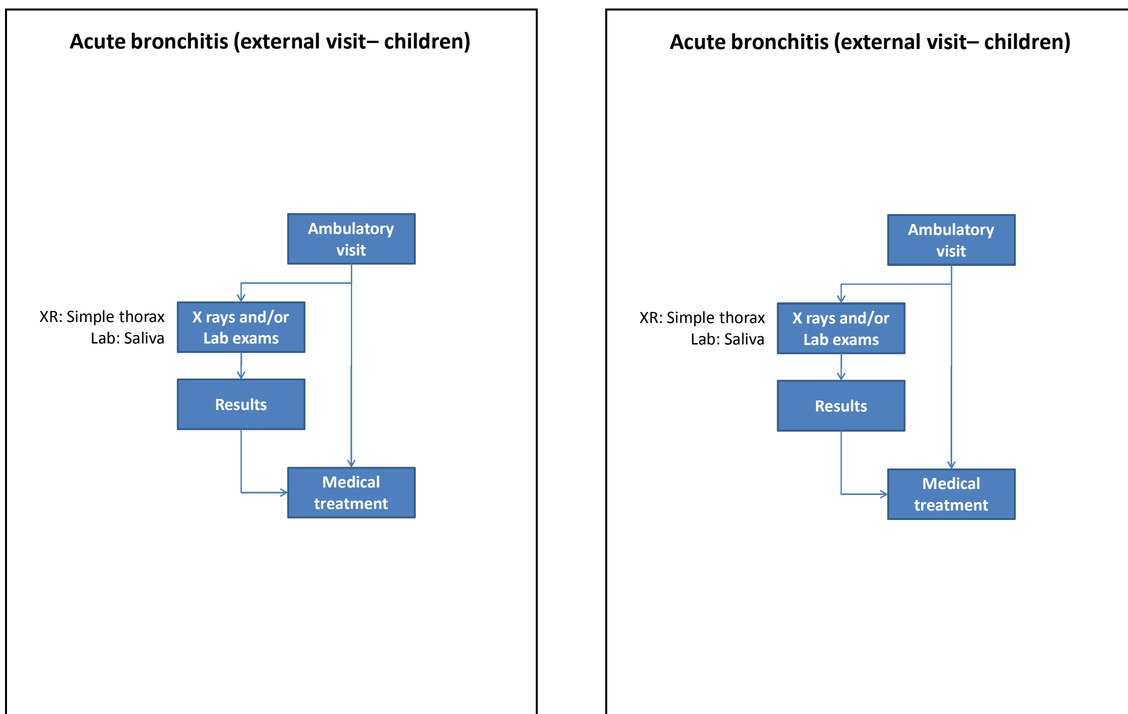
The price vector includes elements such as health interventions and services for the health problem in question (and medications). Each element of the price vector is equal to the average calculated cost of the respective health intervention or service. To calculate the cost of each health intervention or service, we multiply the utilization rate of the respective services by the average facility cost of the services.

# 4. DATA ANALYSIS

No data from Huancavelica was available at the time this report was drafted. Therefore, we were only able to analyze data for two regions, La Libertad and Amazonas. The final sample included 6 facilities; three hospitals in La Libertad, a hospital and two health centers in Amazonas. We sampled total of 150 case histories.[6]

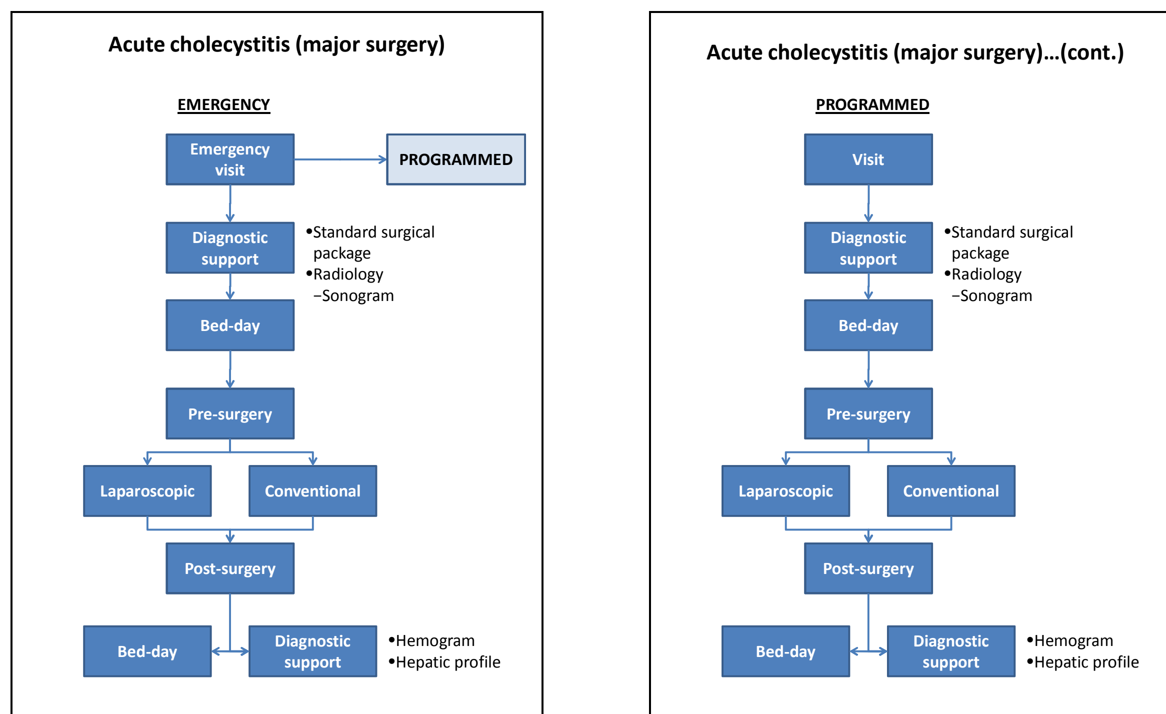
The following are the main procedures we used to cost each health problem.

**FIGURE 2: OVERVIEW OF CLINICAL PROCESSES TO BE COSTED**




[6] See Appendix D.

**FIGURE 2: OVERVIEW OF CLINICAL PROCESSES TO BE COSTED**




*Source:* Authors, based on Lima pilot data.

## 4.1 AVERAGE COSTS OF HEALTH PROBLEMS

The following table displays average costs by level of care. Cholecystitis involved Type III facilities; epilepsy Type I and II; and bronchitis Type I.

Surgical intervention for cholecystitis has an average cost of 1,624.54 soles. Intervention for childhood epilepsy has an average cost of 29.89 soles, including exams and medications. Finally, intervention for acute bronchitis in children has an average cost of 23.08 soles, including mainly office visits and medications.

For cholecystectomy, the bed-days cost component varies significantly from hospital to hospital, as shown in Table 6. We feel that exams are likely under-valued in the average cost of this intervention, as this component was only measured in one hospital (La Libertad Teaching Hospital), and incompletely at that.

It should also be noted that it was not possible to impute the costs of the buildings (depreciation) as we lacked reliable data on the residual value of the facilities involved.

For epilepsy, the cost items appear reasonable and do not vary as greatly among facilities as for cholecystitis, with the exception of exams. Some epilepsy consults require very complex, high-cost exams (such as electroencephalography), and others require none. For medications, one hospital (Virgen de Fátima Regional Hospital in Amazonas) had very low costs.

For bronchitis, costs generally appear reasonable, but it should be noted that exams were not costed. In some cases exams were not well reported (Chepén Hospital in La Libertad). In others there were no exams noted in the case histories sampled (Virgen de Fátima Regional Hospital in Amazonas). In still others, only a few exams were sampled, such as in Luya Health Center in Amazonas (one exam, which was not costed) and the Pedro Ruiz Gallo Health Center, with 2 exams, which were not costed.

**TABLE 6: AVERAGE OBSERVED COSTS BY LEVEL OF CARE**

| | Intervention | | |
|---|---|---|---|
| Type of expense | Conventional cholecystectomy in adults (Type III) | Epilepsy (Outpatient treatment) Children under 14 years old (Type I and Type II) | Acute bronchitis (Outpatient treatment) Children under 14 years old (Type I) |
| Fixed costs | | | |
| Bed-days | 284.63 | n.a. | n.a. |
| Human resources | 177.33 | 5.86 | 5.79 |
| Depreciation of equipment and tools | 190.20 | 1.33 | 0.12 |
| Depreciation of building | ua | ua | ua |
| General expenses | 763.39 | 6.01 | 1.77 |
| Subtotal fixed costs | 1,415.55 | 13.21 | 7.69 |
| Variable costs | | | |
| Exams | 23.20 | 2.33 | 0.00 |
| Medications and supplies | 185.79 | 13.35 | 7.70 |
| Partial consumption materials and supplies | ua | 0.23 | 0.28 |
| Complete consumption materials and supplies | ua | 13.12 | 7.42 |
| Subtotal variable costs | 208.98 | 15.68 | 15.39 |
| Total | 1,624.54 | 28.89 | 23.08 |

*Note: n/a.: ua: unavailable, n.a.: not applicable.*
*Source:* Authors.

The following table lists the observed costs in detail, illustrating the differences noted.

## TABLE 7: GENERAL RESULTS OF COST STUDY

| Intervention | Cost component | Hospital Regional Docente La Libertad | Hospital Belén La Libertad | Hospital Chepén La Libertad | Hospital Regional Vírgen de Fátima Amazonas | Centro de Salud Luya Amazonas | Centro de Salud Pedro Ruiz Gallo Amazonas | Average by level |
|---|---|---|---|---|---|---|---|---|
| | Fixed Costs | | | | | | | |
| | Bed-day | 347.93 | 221.33 | | 1,304.11 | | | 284.63 |
| | Human resources | 255.43 | 99.23 | | 185.87 | | | 177.33 |
| | Equipment and instrument depreciation | 190.20 | nd | | nd | | | 190.20 |
| | Building depreciation | nd | nd | | nd | | | n.d. |
| Conventional Cholecystectomy | General expenditures | 219.88 | 1,306.91 | | 232.00 | | | 763.39 |
| in Adults | *Subtotal fixed costs* | *1,013.44* | *1,627.46* | | *1,721.97* | | | *1415.55* |
| | Variable Costs | | | | | | | |
| | Exams | 23.20 | nd | | nd | | | 23.20 |
| | Medications and inputs | 286.52 | 85.05 | | 494.47 | | | 185.79 |
| | *Subtotal variable costs* | *309.72* | *85.05* | | *494.47* | | | *208.98* |
| | Total | 1,323.16 | 1,712.51 | | 2,216.44 | | | 1624.54 |
| | Fixed Costs | | | | | | | |
| | Bed-day | na | na | na | na | na | na | n.a |
| | Human resources | 8.46 | 9.58 | nd | 9.22 | 4.61 | 3.76 | 5.86 |
| | Equipment and instrument depreciation | 0.44 | 0.85 | nd | 2.49 | 0.17 | nd | 1.33 |
| | Building depreciation | nd | nd | nd | nd | nd | nd | n.d. |
| | General expenditures | 5.00 | 6.49 | nd | 10.55 | 1.48 | nd | 6.01 |
| Epilepsy (External Visit) | *Subtotal fixed costs* | *13.89* | *16.91* | *nd* | *22.25* | *6.27* | *3.76* | *13.21* |
| Children under 14 years of age | Variable Costs | | | | | | | |
| | Exams | nd | 80.95 | nd | 0.00 | 4.67 | nd | 2.33 |
| | Medications and inputs | 34.93 | 30.43 | nd | 3.18 | 23.51 | | 13.35 |
| | Inputs and materials of partial use | 0.15 | 0.15 | nd | 0.18 | 0.28 | nd | 0.23 |
| | Medications and inputs of full use | 34.78 | 30.28 | nd | 3.00 | 23.23 | | 13.12 |
| | *Subtotal variable costs* | *34.93* | *111.39* | *nd* | *3.18* | *28.18* | *0.00* | *15.68* |
| | Total | 48.82 | 128.29 | nd | 25.43 | 34.45 | 3.76 | 28.89 |
| | Fixed Costs | | | | | | | |
| | Bed-day | | | na | na | na | na | n.a. |
| | Human resources | | | 4.69 | 9.22 | 5.07 | 6.51 | 5.79 |
| | Equipment and instrument depreciation | | | 0.28 | 7.11 | 0.12 | nd | 0.12 |
| | Building depreciation | | | nd | nd | nd | nd | n.d. |
| | General expenditures | | | 5.95 | 10.55 | 1.77 | nd | 1.77 |
| Acute Bronchitis (External Visit) | *Subtotal fixed costs* | | | *10.92* | *26.87* | *6.97* | *6.51* | *7.69* |
| Children under 14 years of age | Variable Costs | | | | | | | |
| | Exams | | | nd | 0.00 | 0.00 | 0.00 | 0.00 |
| | Medications and inputs | | | 11.21 | 8.81 | 13.73 | 1.67 | 7.70 |
| | Inputs and materials of partial use | | | 4.37 | 0.33 | 0.29 | 0.27 | 0.28 |
| | Medications and inputs of full use | | | 6.84 | 8.49 | 13.44 | 1.40 | 7.42 |
| | *Subtotal variable costs* | | | *22.42* | *17.63* | *27.45* | *3.34* | *15.39* |
| | Total | | | 33.34 | 44.50 | 34.42 | 9.85 | 23.08 |

*Source:* Authors.

## 4.2 COSTS BY FACILITY

In comparing results by facility (Table 8), differences across hospitals for cholecystectomy costs can be attributed mainly to total spending on bed-days in the Virgen de Fátima Regional Hospital in Amazonas. This finding would be explained if this hospital was much larger than the other two in question, but this does not appear to be the case. The differences between hospitals within La Libertad, especially for general expenses, are attributable to very low spending in Belén Hospital. For epilepsy, differences between the two hospitals in La Libertad are nearly exclusively due to exams. Exams were costed for Belén Hospital but not for the Regional Teaching Hospital. In the Virgen de Fátima Regional Hospital in Amazonas, epilepsy is likely undervalued as well, as exams were not costed for this facility either.

**TABLE 8: CALCULATED UNIT COSTS, BY HEALTH INTERVENTION AND HEALTH FACILITY**

| Intervention | Regional Teaching Hospital La Libertad | Belén Hospital La Libertad | Chepén Hospital La Libertad | Virgen de Fátima Regional Hospital Amazonas | Luya Health Center Amazonas | Pedro Luis Gallo Health Center Amazonas |
|---|---|---|---|---|---|---|
| Conventional cholecystectomy in adults | 1,323.16 | 1,712.51 | | 2,216.44 | | |
| Epilepsy (Outpatient treatment) in children under the age of 14 | 83.75 | 158.58 | | 28.43 | 57.68 | 3.76 |
| Acute bronchitis (Outpatient treatment) in children under the age of 14 | | | 28.97 | 44.18 | 34.13 | 9.58 |

*Source:* Authors.

Among the health centers in Amazonas, the only centers with available data, differences for epilepsy costs are attributable to the fact that for the Pedro Ruíz Gallo Health Center, only human resources costs were collected, and these were under-valued as not all personnel involved were included. Therefore, the data from Luya Health Center would seem to be more reliable.

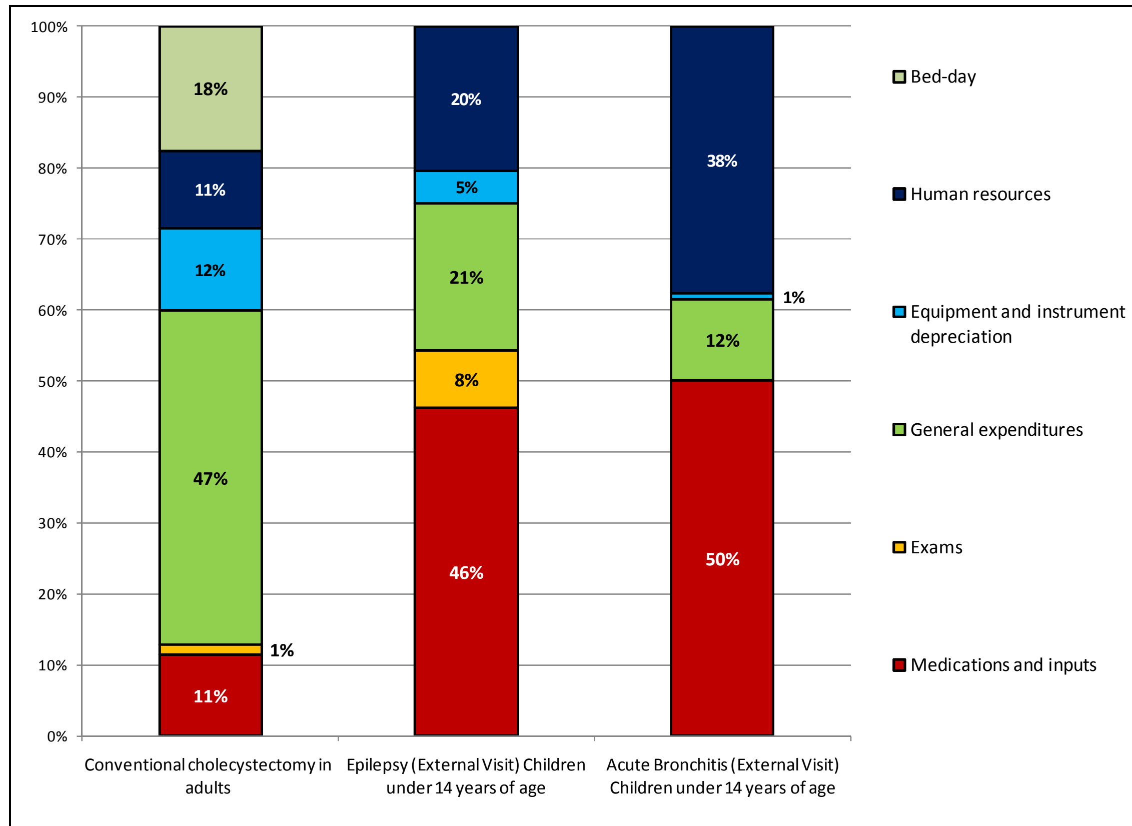
## 4.3 DISTRIBUTION OF COST COMPONENTS

In terms of average distribution of cost components, bronchitis shows the most intensive use of human resources, which is logical given that this intervention uses the least amount of technology or equipment. For bronchitis, medications are the most significant cost component, followed by human resources, depreciation of equipment and materials, and finally general expenses.

Exams are the largest cost component of total cost for a childhood epilepsy intervention, followed by medications (treatment for 10 days) and then human resources. General costs and depreciation of materials and equipments are in last place.

For the surgical intervention, conventional cholecystectomy in adults, as might be expected the largest cost component was bed-days, then medications, followed closely by human resources, then depreciation of equipment and medical tools. Finally, a very low percentage was accounted for by exams.

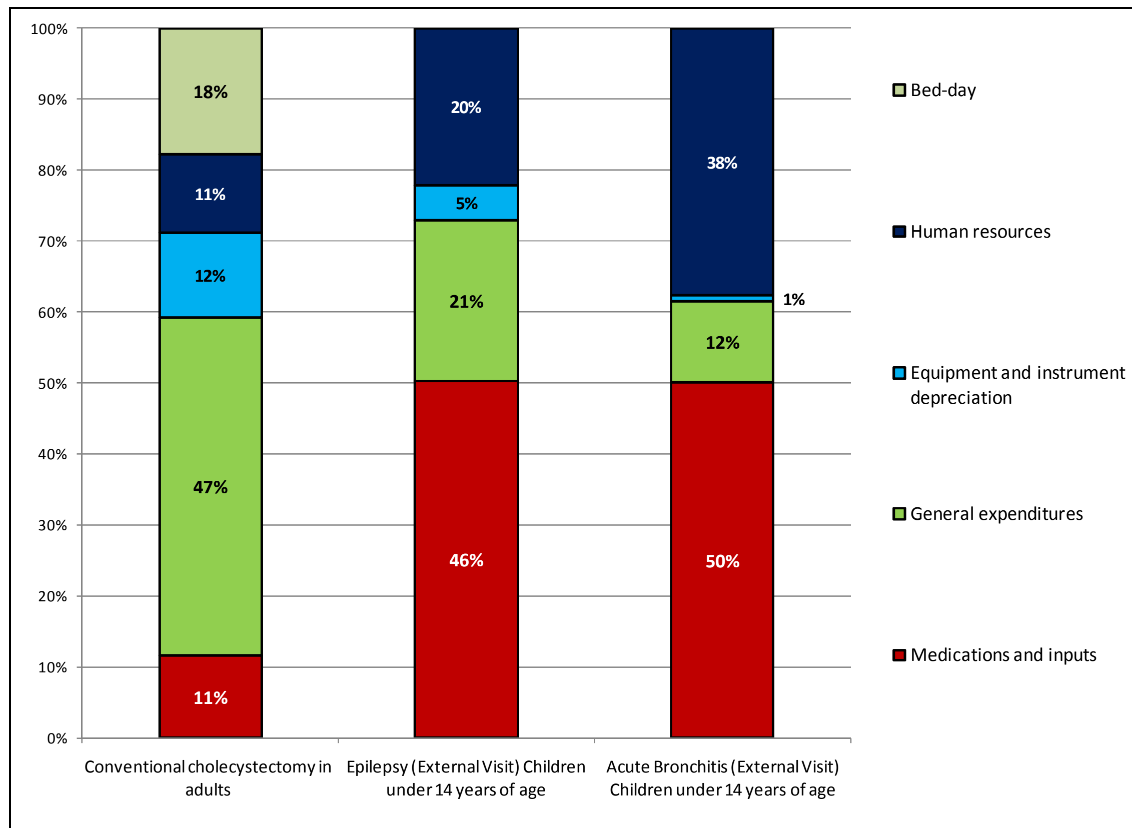
## FIGURE 3: DISTRIBUTION OF COST COMPONENTS




*Source:* Authors.

It is likely that that the exams were heavily skewed towards childhood epilepsy, or rather, that the sample was not able to capture a sufficient amount of data for a more definitive average. If we graph the above distribution without exams, the distribution for childhood epilepsy changes significantly (while remaining practically unchanged for the other two pathologies). In the second graph, medications become the largest cost, followed by human resources. This result appears more logical.

**FIGURE 4: DISTRIBUTION OF COST COMPONENTS, NOT INCLUDING EXAMS**

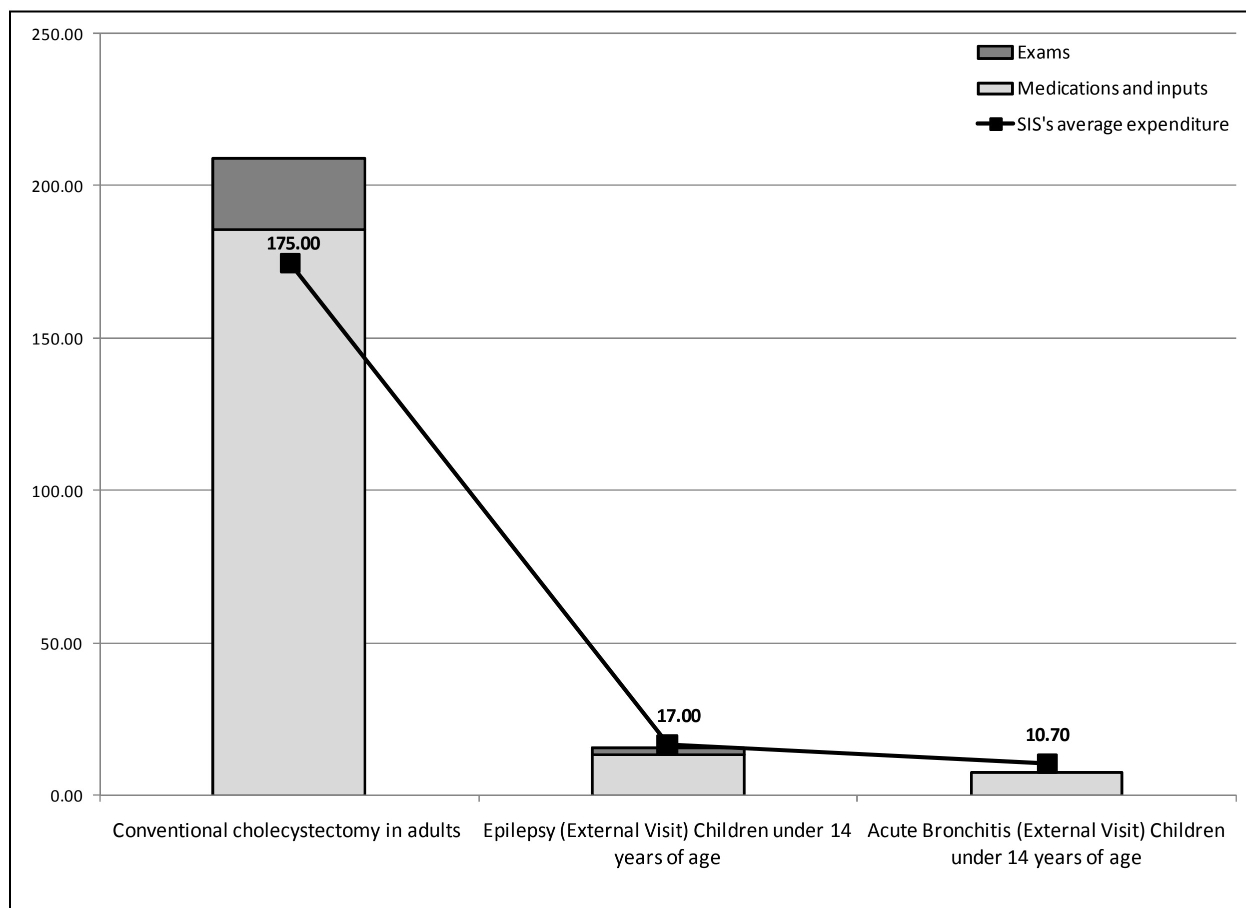



*Source:* Authors.

## 4.4 GAPS BETWEEN SIS FEES OR PAYMENTS AND OBSERVED COSTS

In comparing the calculated observed costs with the amounts transferred by SIS for these health problems, it is important to keep in mind that SIS only finances part of these costs by definition. SIS finances variable costs, in particular, exams, medications, and medical supplies.

**FIGURE 5: GAPS BETWEEN SIS FEES/PAYMENTS AND OBSERVED COSTS, BY LEVEL OF CARE, IN SAMPLED FACILTIES**




*Source:* Authors.

Our findings indicate that SIS standard costs are fairly close to observed costs for acute bronchitis in children (7.70 soles as calculated by this costing study vs. 10.70 soles average national SIS payment, according to their care database), with the notable caveat that our sample included practically no exams. For childhood epilepsy, SIS transfers (average national payment of 17.00 soles) are also within the range of costs as calculated in this study (15.68 soles). These two cases indicate, then, that SIS is covering the costs of medications and supplies if not the costs of exams. This analysis is by level of care. If we were to consider average costs of consults and surgeries over all types of facilities, the results would vary. This finding suggests that transfers should be differentiated by level of care.

According to the SIS database, when cholecystitis is associated with diagnostic code CIE-10 and grouped individually (by patient), the mode, a better measure of the central tendency, is 175 soles. The variable cost calculated in our study is 208.98 soles, 89% of which is attributable to medications and supplies. In this case, the SIS transfer is undervalued.

# 5. LESSONS AND CONCLUSIONS

Understanding real costs is important for all economic activity and for the health sector in particular. This knowledge is necessary for health planning, budgeting, evaluation, incorporation of new technology, and efficient management of providers. Evaluating real costs as directly as possible is a fundamental task of a public financing agency.

SIS's chosen costing method will be the basis for its analysis and eventual selection of fee mechanisms. To implement this process, we addressed the following objectives: design an observed costing method for health problems and corresponding tools; train SIS personnel in methods and tools required for observed costing of health problems, to transfer technical knowledge; carry out a pilot study to collect field data, to verify the services associated with each health problem and to train SIS personnel in the data gathering tools; gather the data required for the observed costing study, on three selected health problems in three facilities in three departments of Peru; enter and analyze the information collected by SIS personnel for the costing calculations; and estimate the frequency of health interventions and associated services. Using the data gathered, we then carried out the following additional objectives: perform a costing study of the health interventions to obtain the unit cost for the set of services identified for the health problem; obtain the prices of medications, supplies, and medical devices associated with the health problem; develop a price vector for the health interventions for each health problem; calculate observed costs.

Our findings indicated that SIS standard costs are fairly close to observed costs for acute bronchitis in children (calculated observed cost of 8.85 soles vs. 10.7 soles average national SIS transfer), with the important caveat that our sample included practically no exams. On the other hand, for childhood epilepsy, SIS transfers (national average of 17 soles) fail to cover a significant portion of observed costs (calculated at 52 soles). However, if exams are excluded, the standard and observed costs are similar (23 soles). These two cases indicate, then, that SIS is covering the costs of medications and supplies but not the costs of exams. Finally, for cholecystectomy, the mode SIS transfer was 175 soles. The variable cost calculated in this study was 312 soles, 93% of which was attributable to medications and supplies. In this case, SIS transfers are undervalued.

Experience with this study yielded a number of lessons learned regarding the observed costing process. First, it is important to develop a prior consensus on technical definitions and other issues regarding the health problems to be costed, including diagnosis, treatment, and follow-up. This does not mean that there must be an official national protocol before beginning the fieldwork, although the fieldwork can eventually contribute to the development of a national care protocol.

Second, a successful study will require significant time in the field, gathering data from facilities. Third, because union and political movements can jeopardize data acquisition, fieldwork should be planned for periods of relative calm. Fourth, supervision during fieldwork is crucial, for dealing with unexpected problems or unfamiliar data management systems.

Finally, obtaining reliable central data, such as medication and equipment prices or cost of buildings, conserves fieldwork efforts.

SIS will need to perform a large costing study in preparation for adjusting their payment system. We recommend that SIS begin with priority primary care services and move on to hospital services at a later stage. It is vital that the sample size, while remaining feasible for data collection, is large enough to be representative of the country's health system.

# APPENDIX A: PROJECT TIMELINE

The following Gantt chart provides a timeline, mainly for the data collection activities. The Gantt chart presents the Stage 1 activities in detail, including logistics, development of formulas, fieldwork, data analysis, decisions shared with SIS counterparts, etc. As shown, the critical periods of the study are Stages 1 and 3, in which the fieldwork takes place. The activities in these critical periods should be prioritized to ensure timely completion of the project.

## FIGURE 6: PROJECT TIMELINE

**HS 20/20: STRENGTHENING THE ECONOMIC-FINANCIAL MANAGEMENT OF THE INTEGRAL HEALTH INSURANCE**
**HS 20/20 technical assistance Gantt Chart**

| | | 15-Oct | 22-Oct | 29-Oct | 05-Nov | 12-Nov | 19-Nov | 26-Nov | 03-Dic | 10-Dic | 17-Dic | 24-Dic | 31-Dic | 07-Ene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | **Activities** | | | | | | | | | | | | | |
| **A.** | **Technical assistance for costing and fee updating** | | | | | | | | | | | | | |
| ***A.1*** | ***Costs*** | | | | | | | | | | | | | |
| A.1.1 | Trip to collect information for diagnosis | | | | | | | | | | | | | |
| A.1.2 | Review of norms, costing methodologies and experience in Peru | | | | | | | | | | | | | |
| A.1.3 | Review of information available for costing | | | | | | | | | | | | | |
| A.1.4 | Develop a costing methodology by health intervention | | | | | | | | | | | | | |
| A.1.5 | Select health interventions based on priorities, complexity, geography, etc. | | | | | | | | | | | | | |
| A.1.6 | Present and approve costing methodology | | | | | | | | | | | | | |
| A.1.7 | Select health facilities for costing exercise | | | | | | | | | | | | | |
| A.1.8 | Adjust costing methodology based on comments and suggestions | | | | | | | | | | | | | |
| A.1.9 | Validate health processes | | | | | | | | | | | | | |
| A.1.10 | Design and prepare costing tools | | | | | | | | | | | | | |
| A.1.11 | Prepare costing tool manual | | | | | | | | | | | | | |
| A.1.12 | Train data collectors | | | | | | | | | | | | | |
| A.1.13 | Train SIS staff in costing methodology and costing tools | | | | | | | | | | | | | |
| A.1.14 | Collect data with tools (field work) | | | | | | | | | | | | | |
| A.1.15 | Collect additional information | | | | | | | | | | | | | |
| A.1.16 | Elaboración del programa de entrada de datos | | | | | | | | | | | | | |
| A.1.17 | Enter data collected | | | | | | | | | | | | | |
| A.1.18 | Review and validate data | | | | | | | | | | | | | |
| A.1.19 | Cost estimation | | | | | | | | | | | | | |

# APPENDIX B: FIELD DATA COLLECTION TOOL

Establecimiento (1)

**ESTABLECIMIENTO**
**Ficha de información general (1/2)**

**Número de cuestionario** [ ]

**Código y nombre de establecimiento** [ ] [ ]

**Nombre de persona de contacto** [ ]

**Teléfono de contacto** [ ]

**Cantidad total de horas personal médico en 2006** [ ]

**Gastos**

| RUBRO | GASTO TOTAL 2006 (S/.) |
|---|---|
| Salarios personal | |
| Insumos | |
| Medicamentos | |
| Electricidad | |
| Agua | |
| Gas | |
| Teléfono | |
| Comunicaciones y correspondencia | |
| Otros servicios | |
| Aseo | |
| Materiales de oficina | |
| Alimentos y bebidas | |
| Combustibles | |
| Mantención y reparación de edificio | |
| Mantención y reparación de equipos | |
| Otros gastos | |
| **Total** | 0 |

Total gastos generales:
S/. 0

Gasto general por minuto de personal médico:
S/.

**Ingresos**

| FUENTE | INGRESO TOTAL 2006 (S/.) |
|---|---|
| Recursos Ordinarios | |
| Donaciones y Transferencias SIS | |
| Recursos Directamente Recaudados | |
| Otras Donaciones y Transferencias | |
| Encargos | |
| Otros ingresos | |
| **Total** | 0 |

**Año de construcción del establecimiento:** [ ]

**Costo de construcción (S/.):** [ ] **Soles del año:** [ ]

**Superficie del establecimiento (m2):** [ ] Costo en S/. 2006: [ ]

**Superficie del establecimiento (m2):** [ ] Costo por m2 (S/.): [ ]

**Años de vida útil:** [ ] Costo anual por m2 (S/.): [ ]

# ESTABLECIMIENTO

## Ficha de información general (2/2)

### Producción de servicios

| RUBRO | CANTIDAD 2006 |
|---|---|
| **Bronquitis Aguda (Consulta Externa)** | |
| Consultas Bronquitis Aguda Niños Menores de 14 Años | |
| Total otras consultas ambulatorias realizadas en el mismo servicio | |
| **Epilepsia (Consulta Externa)** | |
| Consultas Epilepsia Menores de 14 Años | |
| Total otras consultas ambulatorias realizadas en el mismo servicio | |

¿Se atienden las bronquitis y las epilepsias en el mismo servicio? ☐ Sí ☐ No

| RUBRO | CANTIDAD 2006 |
|---|---|
| **Colecistectomía** | |
| Colecistectomías laparoscópicas | |
| Colecistectomías abiertas | |
| Total otras cirugías realizadas en el establecimiento | |
| **Imagenología** | |
| Rayos X de Tórax | |
| Otros exámenes de imagenología | |
| **Exámenes de laboratorio** | |
| Hematológicos | |
| Bioquímicos | |
| Parasitológicos | |
| Microbiológicos | |
| Urinoanalysis | |
| Otros | |
| **Hospitalizaciones** | |
| Ingresos | |
| Egresos | |
| Días-cama ocupados en 2006: | |
| Cantidad promedio de camas disponibles durante el año | |

# SALARIO

## Ficha para cálculo de salario promedio

**Tipo de funcionario**

**Dotación 2006**

Cantidad de funcionarios que estuvieron 7 meses o más en el establecimiento:

**Lista de funcionarios**

| # | NOMBRE FUNCIONARIO | CARGO | TIPO DE CONTRATO N = NOMBRADO C = CONTRATADO | REMUNERACION BRUTA (S/. POR AÑO) | AGUINALDOS (S/. POR AÑO) | GUARDIAS (S/. POR AÑO) | RECURSOS ORDINARIOS (S/. POR AÑO) | RECURSOS DIRECTAMENTE RECAUDADOS (S/. POR AÑO) | OBLIGACIONES AL EMPLEADOR (S/. POR AÑO) | OTROS APORTES (ESSALUD, ALTO/BAJO RIESGO, S/. POR AÑO) | TOTAL (S/. POR AÑO) | HORAS TRABAJADAS AL AÑO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | 0.00 | |
| 2 | | | | | | | | | | | 0.00 | |
| 3 | | | | | | | | | | | 0.00 | |
| 4 | | | | | | | | | | | 0.00 | |
| 5 | | | | | | | | | | | 0.00 | |
| 6 | | | | | | | | | | | 0.00 | |
| 7 | | | | | | | | | | | 0.00 | |
| 8 | | | | | | | | | | | 0.00 | |
| 9 | | | | | | | | | | | 0.00 | |
| 10 | | | | | | | | | | | 0.00 | |
| 11 | | | | | | | | | | | 0.00 | |
| 12 | | | | | | | | | | | 0.00 | |
| 13 | | | | | | | | | | | 0.00 | |
| 14 | | | | | | | | | | | 0.00 | |
| 15 | | | | | | | | | | | 0.00 | |
| 16 | | | | | | | | | | | 0.00 | |
| 17 | | | | | | | | | | | 0.00 | |
| 18 | | | | | | | | | | | 0.00 | |
| 19 | | | | | | | | | | | 0.00 | |
| 20 | | | | | | | | | | | 0.00 | |
| | Total | | | | | | | | | | 0.00 | 0.00 |
| | Costo promedio por minuto | | | | | | | | | | | |

**CONSULTA GENERAL**

**Ficha para información sobre recursos humanos, edificio y equipos**

**Tipo de consulta** **Bronquitis Aguda (Consulta Externa) Niños Menores de 14 Años**

**Producción anual 2006** **Cantidad total de consultas en el 2006:**

**Espacio del servicio** **Superficie total del área del servicio (m2):** **Cantidad de boxes:**

**Recurso humano** Indicar fuente: Registros Admin. Observación Visita guiada (nombre informante)

| # | ID | TIPO DE TRABAJADOR | DESCRIPCIÓN DE LA PRESTACIÓN REALIZADA | CANTIDAD DE TRABAJADORES | TOTAL HORAS/HOMBRE POR SEMANA | PORCENTAJE DE CONSULTAS EN LAS CUALES PARCITIPA (%) | TIEMPO PROMEDIO DEDICADO EN UNA CONSULTA (MIN.) |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |

Consulta Bronquitis (I)

## CONSULTA GENERAL

**Ficha para información sobre recursos humanos, edificio y equipos**

**Equipos e instrumentos utilizados**

Indicar fuente: Registros Admin. [ ] Observación [ ] Visita guiada (nombre informante) [ ]

| # | ID | EQUIPO/INSTRUMENTO | CANTIDAD TOTAL DE EQUIPOS (SUMAR TOTAL PARA TODOS LOS BOXES) | VIDA ÚTIL (AÑOS) | PORCENTAJE DE CONSULTAS EN LAS CUALES SE USA EL EQUIPO (%) * | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |

* Cuente todos los tipos de consultas que hacen uso del equipo, y no sólo la consulta que se está costeando.

Consulta Bronquitis (I)



## CONSULTA GENERAL

**Ficha para información sobre recursos humanos, edificio y equipos**



**Insumos y materiales de consumo parcial**

Indicar fuente: Historia Clínica [ ] Registros Admin. [ ] Observación [ ] Entrevista/Visita [ ]

| # | ID | ÍTEM | CANTIDAD | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |

**CONSULTA GENERAL**
**Ficha de transcripción de historia clínica**

| Campo | Valor | |
|---|---|---|
| **Tipo de consulta** | **Bronquitis Aguda (Consulta Externa) Niños Menores de 14 Años** | |
| **Número de caso (número serial en la muestra de fichas)** | 1 | |
| **Número de caso (código de ficha interno del establecimiento)** | | |
| **Nombre completo del paciente** | | |
| **Fecha de nacimiento (DD/MM/AAAA)** | | |
| **Edad del paciente** | | |
| **Fecha de consulta (DD/MM/AAAA)** | | |
| **Diagnóstico principal** | | |
| **Código del diagnóstico principal** | | |
| **Otros diagnósticos** | | |

**CONSULTA GENERAL**

**Ficha de transcripción de historia clínica**

**Exámenes de laboratorio, imágenes y otros procedimientos**

Indicar fuente: Historia Clínica ☐ Registros Admin. ☐ Observación ☐ Entrevista/Visita ☐

| # | ID | ÍTEM | CANTIDAD | PRECIO EXTERNO (S/.) |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |

## CONSULTA GENERAL

### Ficha de transcripción de historia clínica

**Medicamentos e insumos de consumo completo**

Indicar fuente: Historia Clínica ☐ Registros Admin. ☐ Observación ☐ Entrevista/Visita ☐

| # | ID | ÍTEM | UNIDAD DE MEDIDA<br>PRESEN-TACIÓN | <br>CONCEN-TRACIÓN | <br>UNIDAD DE PRECIO | CANTIDAD POR DÍA | DIAS DE TRATAMIENTO | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
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| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |

**CIRUGÍA**

**Ficha para cálculo de costos**

**Tipo de cirugía general** | **Colecistectomía en adultos**

**Tipo de cirugía específica** |

**Producción anual 2006** — Cantidad total de cirugías: | Superficie del área de cirugía, sumando todas las salas de operación (m2) |

**Recurso humano para la cirugía: Colecistectomía en adultos** — Indicar fuente: Registros Admin. | Observación | Visita guiada (nombre informante)

| # | ID | TIPO DE TRABAJADOR | BREVE DESCRIPCIÓN DEL PROCEDIMIENTO REALIZADO | CANTIDAD DE TRABAJADORES | TOTAL HORAS/HOMBRE POR SEMANA | PORCENTAJE DE CIRUGÍAS EN LAS CUALES PARCITIPA (%) | TIEMPO PROMEDIO DEDICADO EN UNA CIRUGÍA (MIN.) |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |

**CIRUGÍA**

**Ficha para cálculo de costos**

**Equipos e instrumentos utilizados** — Indicar fuente: Registros Admin. [ ] Observación [ ] Visita guiada (nombre informante) [ ]

**Cantidad de salas de operación** — Cantidad de salas: [ ]

| # | ID | EQUIPO/INSTRUMENTO | CANTIDAD TOTAL DE EQUIPOS (SUMAR TOTAL PARA TODAS LAS SALAS) | VIDA ÚTIL (AÑOS) | PORCENTAJE DE CIRUGÍAS EN LAS CUALES SE USA EL EQUIPO (%) | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
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| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |

**CIRUGÍA**

**Ficha para cálculo de costos**

**Medicamentos e insumos de consumo completo**

Indicar fuente: Registros Admin. [ ] Observación [ ] Visita guiada (nombre informante) [ ]

| # | ID | ÍTEM | UNIDAD DE MEDIDA: PRESEN-TACIÓN | UNIDAD DE MEDIDA: CONCEN-TRACIÓN | UNIDAD DE PRECIO | CANTIDAD POR DÍA | DIAS DE TRATAMIENTO | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
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| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| 21 | | | | | | | | |
| 22 | | | | | | | | |
| 23 | | | | | | | | |
| 24 | | | | | | | | |
| 25 | | | | | | | | |

**CIRUGÍA**
**Ficha para cálculo de costos**

| | Registros Admin. | Observación | Visita guiada (nombre informante) |
|---|---|---|---|
| **Insumos y materiales de consumo parcial** — Indicar fuente: | | | |

| # | ID | ÍTEM | CANTIDAD | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
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| 5 | | | | |
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| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |

## CIRUGÍA

### Ficha de transcripción de historia clínica

| Campo | Valor | | | | |
|---|---|---|---|---|---|
| **Tipo de cirugía** | Colecistectomía en adulto | Laparoscópica | | Convencional | |
| **Número de caso (número serial en la muestra de fichas)** | 1 | | | | |
| **Número de caso (código de ficha interno del establecimiento)** | | | | | |
| **Nombre paciente** | | | | | |
| **Fecha de nacimiento (DD/MM/AAAA)** | | | | | |
| **Edad del paciente** | | | | | |
| **Fecha de hospitalización (DD/MM/AAAA)** | | | | | |
| **Fecha de alta (DD/MM/AAAA)** | | | | | |
| **Fecha de cirugía (DD/MM/AAAA)** | | | | | |
| **Hora de ingreso a pabellón (hh:mm am/pm)** | | | | | |
| **Hora de salida de pabellón (hh:mm am/pm)** | | | | | |
| **Tiempo de preoperatorio (minutos)** | | | | | |
| **Tiempo de recuperación (horas)** | | | | | |

## CIRUGÍA

### Ficha de transcripción de historia clínica

Historia Clínica ☐ Registros Admin. ☐ Observación ☐ Entrevista/Visita ☐

**Exámenes de laboratorio, imágenes y otros procedimientos** Indicar fuente:

| # | ID | ÍTEM | CANTIDAD | PRECIO EXTERNO (S/.) |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |

**CIRUGÍA**

**Ficha de transcripción de historia clínica**

| | | Historia Clínica | Registros Admin. | Observación | Entrevista/Visita |
|---|---|---|---|---|---|
| **Insumos y materiales de consumo parcial** | Indicar fuente: | ☐ | ☐ | ☐ | ☐ |

| # | ID | ÍTEM | CANTIDAD | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |

# CIRUGÍA

## Ficha de transcripción de historia clínica

**Medicamentos e insumos de consumo completo**

Indicar fuente: Historia Clínica ☐ Registros Admin. ☐ Observación ☐ Entrevista/Visita ☐

| # | ID | ÍTEM | UNIDAD DE MEDIDA | | | CANTIDAD POR DÍA | DIAS DE TRATAMIENTO | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|---|---|---|---|
| | | | PRESEN-TACIÓN | CONCEN-TRACIÓN | UNIDAD DE PRECIO | | | |
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
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| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |

## EXÁMENES DE IMÁGENES Y PROCEDIMIENTOS

**Ficha para cálculo de costos**

**Nombre de examen** **RAYOS X TÓRAX**

**Información sobre el servicio que realiza rayos X** Nombre servicio: IMAGENOLOGÍA Superficie (m2):

| | |
|---|---|
| Cantidad de RAYOS X TÓRAX que realizó el servicio en 2006: | |
| Cantidad de otros exámenes que realizó el servicio en 2006: | |
| **Cantidad total de exámenes realizados en el servicio:** | **0** |

Indicar fuente: Registros Admin. | Observación | Visita guiada (nombre informante)

**Recurso humano en el servicio IMAGENOLOGÍA**

| | TIPO DE FUNCIONARIO | CANTIDAD DE FUNCIONARIOS EN EL SERVICIO | HORAS ANUALES POR TIPO DE FUNCIONARIO |
|---|---|---|---|
| 1 | Tecnólogo médico | | |
| 2 | Médico radiólogo | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

## EXÁMENES DE IMÁGENES Y PROCEDIMIENTOS

### Ficha para cálculo de costos

**Recurso humano que participa en el examen RAYOS X TÓRAX** Indicar fuente: Registros Admin. [ ] Observación [ ] Visita guiada (nombre informante) [ ]

| | TIPO DE FUNCIONARIO | DESCRIPCIÓN BREVE DE PROCEDIMIENTO QUE REALIZA EL FUNCIONARIO | TIEMPO DEDICADO (MIN.) |
|---|---|---|---|
| 1 | Tecnólogo médico | Procedimiento | |
| 2 | Médico radiólogo | Analisis | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

**Equipos utilizados para realizar el servicio IMAGENOLOGÍA** Indicar fuente: Registros Admin. [ ] Observación [ ] Visita guiada (nombre informante) [ ]

| # | ID | EQUIPO | CANTIDAD DE EQUIPOS DISPONIBLES | VIDA ÚTIL (AÑOS) | INDICADOR SI SE UTILIZA EN EL EXAMEN RAYOS X TÓRAX | PRODUCCIÓN ANUAL DE EXÁMENES* | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
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| 9 | | | | | | | |
| 10 | | | | | | | |

* Contar todos los tipos de exámenes que los equipos pueden realizar, y no sólo el tipo de examen que se están costeando.

Imagenología - (genérico)

## EXÁMENES DE IMÁGENES Y PROCEDIMIENTOS

**Ficha para cálculo de costos**

**Insumos y materiales utilizados para el examen RAYOS X TÓRAX**

Indicar fuente: Registros Admin. ☐ Observación ☐ Visita guiada (nombre informante) ☐

| # | ID | ÍTEM | RENDIMIENTO (CANTIDAD DE EXÁMENES) | CANTIDAD PROMEDIO CONSUMIDA EN UN MES | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

## DÍA-CAMA

### Ficha para cálculo de costos

| | |
|---|---|
| **Nombre de servicio de pabellón:** | |
| **Cantidad promedio de camas disponibles en 2006:** | |
| **Cantidad de días-cama disponibles en 2006:** | |
| **Cantidad de egresos en 2006:** | |
| **Estancia promedio en 2006 (días):** | |
| **Días-cama ocupados en 2006:** | |
| **Ocupación en 2006 (%):** | |
| **Gasto total de servicio en 2006 (S/.)** | |
| **Costo medio por día-cama:** | |

# APPENDIX C: INSTRUCTIONS FOR COLLECTION OF COST DATA

## A.1 GENERAL PROCEDURE

In each facility, the field data collection consisted of 6 steps:

1. Send a letter of introduction;
2. Attend a welcome and introductory meeting at the facility
3. Gather general information on the facility
4. Request a brief description of the process for each relevant service
5. Transcribe the case histories; and
6. Perform a guided visit for each relevant service

Table 9 summarizes the steps, including the estimated time and forms used for each step. This table is for reference only.

**TABLE 9 SUMMARY OF GENERAL PROCEDURE, WITH ESTIMATED TIMES AND FORMS USED**

| Step | Activity | Estimated time | Forms used |
|---|---|---|---|
| ***The following steps are carried out once per facility*** | | | |
| 1 | Letter of introduction | - | - |
| 2 | Welcome to the facility | 30 min | - |
| 3 | General information | ½ day | FACILITY<br>SALARY |
| ***The following steps are carried out for each service studied within each facility*** | | | |
| 4 | Brief description of process | 15 min | - |
| 5 | Transcription of case histories | 1 day | GENERAL CONSULT (2.XX)<br>SURGERY (2.XX) |
| 6 | Guided visit | ½ day | OUTPATIENT CONSULT (1)<br>IMAGING, EXAMS, AND PROCEDURES<br>LABS<br>SURGERY (1) |
| | **Total estimated time at health centers** | **3 days** | |
| | **Total estimated time at hospitals** | **8 days** | |

A more detailed description of each step follows below.

### A.1.1 LETTER OF INTRODUCTION

It is important to inform the relevant authorities at the selected facility of the impending data collection visit. A first letter should be addressed to the Director of the facility's Regional Health Office (see Figure 5.1).

Figure 5.1 Sample letter for Regional Health Center director

[DATE]

Director [NAME]
Regional Health Office [Region]
[Address]

Dear Director:

The Integral Health Insurance (SIS) is conducting an observed cost study of selected health problems and associated services in facilities within its jurisdiction. The program has selected the following facilities to be included in this study [list facilities].

Field data collection will begin the week of [DATE]. The services to be costed, including support and diagnostic services, are the following: acute bronchitis in children (outpatient treatment); acute cholecystitis with surgery; and childhood epilepsy (outpatient treatment).

We ask that you assist in coordinating the visits in order to facilitate the field data collection by the trained [ODSIS and DIRESA] personnel.

Thank you in advance for your support with this project,

[NAME OF PERSON RESPONSIBLE FOR DATA COLLECTION]
[POSITION OF PERSON RESPONSIBLE FOR DATA COLLECTION]
[CONTACT INFORMATION FOR PERSON RESPONSIBLE FOR DATA COLLECTION]

The staff responsible for data collection should also send a letter of introduction to the facility's director, indicating the purpose of the study, the information needed, and the dates for the visit, so that the facility can prepare. The letter should also indicate the personnel needed to accompany the interviewers during their visits and respond to their questions. The facility can then organize an agenda according to its personnel's availability.

Figure 5.2 Sample letter for facility director

[DATE]

Director [NAME]
[NAME OF FACILITY]
[ADDRESS OF FACILITY]

Dear Director:

The Integral Health Insurance (SIS) is conducting an observed costing study of selected health problems and associated services. Your facility has been selected as part of the sample. We ask for your assistance in collecting this data.

We request an initial meeting with the personnel responsible for these services, in order to provide them with more information regarding the study and planned activities and so that they can make the necessary arrangements to facilitate the fieldwork. Personnel trained by [ODSIS and DIRESA] will perform the fieldwork. We expect to begin field data collection on the pathologies and associated services, including diagnostic and support services, on the week of [DATE].

Thank you in advance for your support with this project,

[NAME OF PERSON RESPONSIBLE FOR DATA COLLECTION]
[POSITION OF PERSONRESPONSIBLE FOR DATA COLLECTION]
[CONTACT INFORMATION FOR PERSON RESPONSIBLE FOR DATA COLLECTION]

### A.1.2 WELCOME MEETING AT THE FACILITY

At the facility, a welcome meeting should be held to review the study's objectives and agenda for each service to be costed. The study objectives are:

- Copy data for calculating total observed costs for a set of health services;
- Estimate frequency of health interventions and associated services; and
- Perform an observed costing of health interventions or services to obtain the unit cost of each service associated with the selected health problems

### A.1.3 GENERAL INFORMATION ON THE FACILITY

The interviewers will perform a significant portion of the data collection with facility's administrative personnel. The interviewer should collect general information about the facility and salaries. Although this activity is listed as the third step in the process, **it can be carried out at any time during the visit.** In many cases, the process will require several meetings in which administrative personnel present available data and the interviewer will explain what further information is required. The administrative personnel will then prepare the information as requested.

### A.1.4 BRIEF DESCRIPTION OF THE CARE PROCESS FOR EACH SERVICE

We will require a brief description of the care process for each of the health problems to be costed, from the department chief or director. (In this case, the relevant departments are: pediatrics, emergency, or outpatient clinic for outpatient treatment of acute bronchitis in children; pediatrics, emergency, neurology, pediatric neurology or outpatient clinic for outpatient treatment of childhood epilepsy; and surgery, for the surgical intervention for cholecystitis in adults.) The objective of this description is for interviewer become familiar with the services that he or she will observe. **The order in which the services are addressed does not matter.**

The relevant departments are the following:

- Clinical departments
  - Pediatrics, emergency, or outpatient clinic for outpatient treatment of acute bronchitis in children
  - Pediatrics, emergency, neurology, pediatric neurology or outpatient clinic for outpatient treatment of childhood epilepsy
  - Surgery (for the surgical intervention for cholecystitis in adults)
- Intermediate support services
  - Laboratory
  - Imaging

### A.1.5 TRANSCRIPTION OF CASE HISTORIES FOR EACH HEALTH PROBLEM SELECTED

For each health problem, the interviewer will transcribe the case histories (except for lab and imaging exams). The case histories should be selected using simple random selection (SRS) as described in the following chapter. **It is important to complete Step 4 for the service in question prior to initiating this step**.

### A.1.6 GUIDED VISIT FOR EACH SERVICE SELECTED

The interviewer will participate in a guided visit for each service. The guiding personnel should provide a detailed description of the process, so that the interviewer gains an understanding of the steps and stages of the given service. This step involves physically visiting each location where the service is delivered. The interviewer should interact with personnel involved in each stage, including administrative stages. For example, if the attending physician orders an exam, the order travels internally through the administrative personnel that places the order. The interviewer should go to the administrative staff's office and observe the process involved in providing the exam.

## A.2 SIMPLE RANDOM SAMPLE (SRS) OF CLINCAL HISTORIES

The objective of a SRS is to select a subset of case histories from a facility, with an equal chance of each case being chosen. To carry out the SRS, we will use a procedure called **systematical sampling**. To perform a systematic sampling, first we need a comprehensive list of files from which we want to select

the sample, for example, all patients diagnosed with bronchitis at the Pedro Ruiz Gallo Health Center in 2006 (see Excel spreadsheet appendix).[7] In this example, we have 84 patients.

We want to choose 20 of these patients randomly. First, we calculate the sampling **interval,** equal to the size of the population (84) divided by the size of the sample (20). In this example, the interval is 4.2.

Second, we generate a random number between 1 and the value of the interval, using the RAND() function in Excel. The formula is =RAND()*INTERVAL+1.

Third, each patient is numbered in order. We select the first patient whose number is equal to the random number generated above. Then we select the patient whose number is equal to the random number plus the interval. The next patients are those whose numbers are equal to the random number plus twice the interval, and so on. This function can be performed quickly using the Excel function **MOD(x,and)**, with the following formula: MOD(order#-random#, interval). If the mod is less than 1, we select that patient. If not, we do not select that patient (see example in the Excel spreadsheet appendix).

### A.2.1 REPLACEMENTS

In the field, it is always possible that some of the cases selected will not be usable. The file may be blank; it may be mislabeled and not match the selected problem, etc. To address this issue, it is advisable to keep the list from which the sample was taken (for example, the list of 84 patients from the prior example). If one of the cases selected cannot be transcribed, one can replace it with the next case in the last.

The following were the most common reasons for replacing a case:

- The diagnosis was not for the selected health problem
- No case history was available

### A.2.2 TYPICAL PROBLEMS WITH CASE HISTORIES AND METHODS TO ADDRESS PROBLEMS

In reviewing the case histories, some files: had diagnoses similar but not identical to the target health problem; covered more than one visit; or was associated with a follow-up to a prior visit. To address the first problem, one should first evaluate the case using medical criteria to determine which code is used to identify the selected health problem in the given facility. (It is possible that there has been a coding error, but the case corresponds to the desired health problem.) When there are multiple visits in one file, the person collecting the data should transcribe only the visit corresponding to the period studied. When the file is associated with a follow up, the initial visit should be used instead, as long as it occurred during the period studied. If it did not, the case should be replaced.

[7] For bronchitis, it is advisable to use patients as the primary unit to be sampled, rather than services. This is because each patient may receive various services for a single case of bronchitis (the initial visit, and the subsequent follow-ups). The ideal would be to sample from initial visits only, but the records did not specific whether a visit was an initial visit or a follow-up. Another alternative is to sample from all visits, and if a follow-up is selected, replace it with the corresponding initial visit. However, this technique would bias the sample, as patients with more follow-ups would have a better chance of being selected. A better solution is to sample from patients, independent of their number of visits.

## A.3 COSTING METHODS

There are two methods to calculate costs: bottom-up and top-down. The top-down method seeks to determine the average production cost of a health service, dividing total spending for a health service by its production. The bottom-up method seeks to determine the unit cost of producing a health service, including all supplies required, their utilization intensity, and their prices. Table 10 shows the advantages and disadvantages for the two costing methods. We used the bottom-up approach for direct costs and the top-down approach for indirect costs.

**TABLE 10 ADVANTAGES AND DISADVANTAGES OF COSTING METHODS**

| Costing method | Advantages | Disadvantages |
|---|---|---|
| Top-down | Allows for costing large productive groups: bed-days, outpatient treatment<br>Incorporates all recurrent expenses for a facility, without having to enter each detail of each input used<br>- Less costly | Unless the facility has accounting systems with detailed cost centers, cannot distinguish the costs of very specific services, such as upper ARI from lower ARI |
| Bottom-up | Allows for costing specific services<br>- More precise | Does not allow for measurement of shared resources<br>- More costly |

Source: Authors.

## A.4 INFORMATION CONTAINED IN QUESTIONNAIRE

The questionnaire refers to all the forms used for a facility visit. Below we explain the information contained in each questionnaire.

### A.4.1 FACILITY

#### *A.4.1.1 GENERAL INFORMATION FORMS 1 AND 2*

The first general information form for a facility identifies the facility and records income and expenses from the facility's data management system, and documents the data required for calculating depreciation of the building.

The interviewer should label each questionnaire with a unique number and fill out the contact information of the personnel interviewed.

After identifying the facility and the main contact, the interviewer should enter the **Total medical personnel hours for 2006**. This figure represents the total number of contracted hours during 2006 for medical personnel including general practitioners and specialists. For example, if there were 10 physicians contracted for 1800 hours per year, the figure would be 18,000.

Next, the interviewer should gather data regarding income and expenses, which should be available in the facility's data management system. If the income and expenses items on the form are organized differently than the facility's data management system, the interviewer should adjust the form as needed, remaining as consistent with the proposed concepts as possible. The proposed expenditure items for

2006 are: salaries, supplies, medications, electricity, water, gas, phone, communications and correspondence, other services, cleaning, office supplies, food and drinks, fuel, building maintenance and repair, equipment maintenance and repair, and other expenses. Note that the information should be recorded in 2006 soles.

The facility income items to record includes: ordinary resources, SIS transfers and donation, directly collected funds, other transfers and donations, orders, and other income.

The building data should be collected from the facility's administration and finance office. Specifically, the interviewer should record the year the building was constructed, the construction costs, the surface area (in square meters), and years of useful life. In many cases, the construction costs will not be available. The data should be recorded in soles of the year of construction. Due to changes in Peru's currency, this data may be difficult to obtain. Where it is unavailable, the researcher should attempt to note the cost of a building with similar characteristics.

### *A.4.1.2 GENERAL INFORMATION FORM 2/2*

The second general information form is used to record aggregate data on the total 2006 productivity of the department associated with the service, according to facility records. In this form, "department" refers to the area in which the services are provided. For example, acute outpatient treatment for bronchitis is provided in the outpatient clinic.

The interviewer should record the number of visits for the health problem being costed as well as total number of visits for the department as a whole.

For example: If a department provided 100 outpatient visits for acute bronchitis in children under the age of 14, 50 outpatient visits for epilepsy in children under the age of 14, and 1500 total outpatient visits, the data would be recorded as:

| | |
|---|---|
| **Acute bronchitis (Outpatient treatment)** | |
| **Visits for acute bronchitis in children under the age of 14** | *100* |
| **Total number of other outpatient visits in the same department** | *1400* |
| **Epilepsy (Outpatient treatment)** | |
| **Visits for epilepsy in children under the age of 14** | *50* |
| **Total number of other outpatient visits in the same department** | *1450* |

Note that the questionnaire should also specify whether the outpatient visit for bronchitis is provided in the same department (or rather, in the same offices) as the epilepsy visits.

The file should also record information on hospitalizations, including the number of admissions and discharges for 2006. **Occupied bed-days** corresponds to the occupation of a bed in the facility by a patient being diagnosed, treated, or followed for a health problem using hospital facilities. This is the same data as recorded in the **Bed-day** file.

The **Average number of available beds during the year** corresponds to the number of available beds during the year. The figure is an average because the number of beds can increase (new beds purchased) or decrease (bed sent out for maintenance) from month to month. This figure is the same as the one recorded in the **Bed-day** file.

### A.4.2 SALARIES: AVERAGE SALARY CALCULATION FORM

The questionnaire has a salary form for each type of personnel in the facility, including all personnel who intervene directly in addressing the given health problem. The form is generic; the interviewer should make a copy for each type of personnel. The questionnaire includes a salary form for physicians and nurses.

Forms are not limited to 20 lines (20 persons), as each facility may have more or fewer staff. Therefore, the interviewer should adjust the number of lines for personnel according to the number of each type of personnel in the facility.

The information required is the average salary of the personnel who participate in addressing the health problem. For example, in one facility, more than one physician may perform cholecystectomies. Therefore, data should be collected for every surgeon in the facility that provides this service. This task is carried out with the help of the administrative personnel in the facility assigned to assist with the study.

If working from a complete list of salaries for the facility, the interviewer should mark whether and how the personnel participates in the given health problem. For example, a staff member may be marked as "**Attending surgeon**".

The salaries entered are the gross annual salaries. If bonuses are given, these should be added to the annual salary.

### A.4.3 GENERAL VISIT (BROCHITIS OR EPILEPSY)

The general visit is costed using two forms: the first for information on human resources, buildings, and equipment, and the second for information from case histories. Only one **Visit (1)** form should be completed for each health problem, while there should be 20 **Visit (2.XX)** forms for each health problem, one for each case history.

#### *A.4.3.1 VISIT (1): FORM FOR INFORMATION ON HUMAN RESOURCES, BUILDINGS, AND EQUIPMENT*

For both bronchitis in children under the age of 14 and epilepsy in children under the age of 14, the interviewer should record all relevant information that does not appear in the case histories. The form contains four sections: annual production and description of the service; human resources utilized to provide the service; equipment and instruments used to provide the service; and partial-use supplies and materials. The main source for this information should be the guided visit.

In the first section, annual production of the service should match the figure from the form **Facility: General information form 2/2**. The interviewer should also record an estimate of square meters of space used for the visit. **Total surface area ($m^2$)** represents the physical space used for the service. For example, if a facility provides visits for acute bronchitis in two exam rooms, the interviewer should enter the sum of the areas of the two rooms.

The human resources section includes information on the direct participation of all human resources for the given service. Not all workers will participate in every case, which should be noted in the column **Percentage of visits in which personnel participates**.

The third section contains information on the equipment and instruments used, including units available for the service, utilization frequency for each service, and unit price. Examples of items included this section are: stethoscope, thermometer, scale, sphygmomanometer, bed, step, pedals, ophthalmoscope, etc.

The final section includes information on partial-use supplies and materials. For example, during a visit, the doctor might use a prescription pad, a case history form, and a tongue depressor. The interviewer should record the quantity used during the visit, as well as the price. The price recorded should be for the unit used. For example, if one leaf of the prescription pad is used, the price should be for one leaf and not the entire pad.

### *A.4.3.2 VISIT (2.XX): FORM FOR TRANSCRIBING CASE HISTORIES*

Both for bronchitis in children and epilepsy in children, this form is used to record all relevant aspects of the case history, including diagnosis (or diagnoses, if there is more than one) and exams, procedures, and medications ordered. There are 20 case histories for each health problem associated with outpatient treatment. Case histories should be selected randomly (SRS) according to the method detailed in section C.2.[8] Therefore, there will be 20 forms for each health problem.

The form includes a title page where the interviewer should record the identification number for the case history (case number for the sample and the facility, patient information, and visit information such as time and date).

The form has a section for number of exams and medications, including quantity and number of days prescribed. In the exams section, there is a column for price of exam, but <u>only for exams performed outside the facility</u>. If the exam is performed within the facility, price should not be entered.

The medications section refers to the medications ordered for the patient. The medication information should include the type, concentration, amount per day, and days of treatment as well as the unit price of the medication. For example, if the medication is **sodium valproate** the data should be entered in the following way:

**Medicamentos e insumos de consumo completo** — Indicar fuente: Historia Clínica ☐ Registros Admin. ☐ Observación ☐ Entrevista/Visita ☐

| # | ID | ÍTEM | UNIDAD DE MEDIDA: PRESEN-TACIÓN | CONCEN-TRACIÓN | UNIDAD DE PRECIO | CANTIDAD POR DÍA | DIAS DE TRATAMIENTO | PRECIO UNITARIO (S/.) |
|---|---|---|---|---|---|---|---|---|
| 1 | | Valproato sódico | SUS | 0,7ml | SÍ | 3 | 10 | 0.40 |
| | | | | | | | | |

Below is a table with the codes defined by the General Office of Medications, Drugs, and Supplies (DIGEMID).

**TABLE 11 LEGEND OF MEDICATION CODES**

[8] The forms for bronchitis and epilepsy visits are similar enough that this description covers both.

| Medication | Code |
|---|---|
| AMPOLLA | AMP |
| CARTUCHO DENTAL | CDE |
| ENVASE GRANULADO | ENV-GRA |
| ENVASE POLVO | ENV-PLV |
| FRASCO AEROSOL | FCO-AER |
| FRASCO CHAMPU | FCO-CHA |
| FRASCO EMULSION | FCO-EMU |
| FRASCO ENEMA | FCO-ENE |
| FRASCO GOTAS | FCO-GOT |
| FRASCO GOTAS | FCO-GTA |
| FRASCO INYECTABLE | FCO-INY |
| FRASCO JARABE | FCO-JBE |
| FRASCO JARABE | FCO-JBN |
| FRASCO LOCION | FCO-LOC |
| FRASCO SOLUCION | FCO-SOL |
| FRASCO SUSPENSION | FCO-SUS |
| GAS LITRO | GAS-LT |
| GAS LITRO | GAS-LTS |
| MILILITRO | ML |
| OVULO | OVU |
| PARCHE | PARCHE |
| POTE CREMA | POT-CRM |
| POTE ESPUMA | POT-ESP |
| POTE GEL | POT-GEL |
| POTE UNGÜENTO | POT-UNG |
| SUPOSITORIO | SUP |
| TABLETA | TAB |
| AMPOLLA | AMP |
| CARTUCHO DENTAL | CDE |
| ENVASE GRANULADO | ENV-GRA |

**Source: SIS.**

## A.4.4 SURGERY (CHOLECYSTITIS)

### *A.4.4.1 CHOLECYSTECTOMY (1): GENERAL FORM FOR COSTING*

This form is used to record all relevant information that does not appear in the case histories for the given health problem (surgical intervention for cholecystitis), such as types of workers involved (clinical team), time worked for each, and a brief description of the procedure, including clinical supplies and materials used, machines and equipment, etc. The form is to be filled out during the guided visit.

This form is similar to the visit form, but with one major difference: the human resources information refers only to personnel participating in the specific surgery, not all surgical services.

The **Total number of surgeries** refers to all surgeries, not just cholecystectomies.

The interviewer should record the physical area used for the procedure (number of operating suites, in this case).

The file has a section for equipment and instruments; including quantity, price and useful life, and an estimate of the percentage of surgeries that use the given equipment (these issues should be addressed during the guided visit. Some facilities have a predefined set of instruments to be used for a surgery (for example, “surgical instrument box for cholecystectomy”). The interviewer should specify each item in said set on the form.

The form also has sections for medications and partial- and complete-use supplies and materials. This section is for those facilities with predefined sets of supplies to be used before, during, and after surgery. Each item should be specified.

#### *A.4.4.2 CHOLECYSTECTOMY (2.XX): TRANSCRIPTION FORM FOR CASE HISTORY*

This form is used to record all relevant aspect of the case histories, including diagnosis, hospital bed-days, exams and procedures ordered, treatments, and medications. Ten case histories are randomly selected according to the procedure detail in section C.2. Therefore, there will be 10 forms for this sample.

The form includes a title page where the interviewer should record the identification number for the case history (case number for the sample and the facility, patient information, and visit information such as time and date).

There are sections for exams, medications, and partial- and complete-use supplies and materials.

### A.4.5 EXAMS

The questionnaire contains generic forms for imaging and laboratory exams. The interviewer should copy the form and fill one out for each type of exam that appears in the case histories. The forms are to be filled out in the same way for imaging and lab exams. Below is an example using the case of a chest x-ray.

#### *A.4.5.1 FORM FOR CALCULATING COSTS: EXAMPLE – CHEST X-RAY*

The imaging and procedures form records all the data needed to cost a chest x-ray. This form is independent of the others, in the sense that it contains all the data required for the calculation. The interviewer fills out the form during the guided visit for the x-ray, with supplementary administrative information as applicable. The physical area occupied for the service should be included.

The form contains information on human resources, equipment, and supplies. The first section, on human resources, covers both human resources for the service in general and human resources for the specific exam. The first part refers to all personnel associated with the service, by type of personnel, including the number of personnel associated exclusively with that service, and their annual hours worked. The second part refers to the specific exam, including the type of personnel that performs the exam, a brief description of the operation involved, and the average time the exam takes. This allows for a bottom-up costing.

The second section concerns equipment used in providing the service, the quantity available for providing services, the useful life of the equipment, whether the equipment was used during the relevant

exam, an estimate of the annual output of each piece of equipment, and its price. The column **EQUIPMENT USED DURING EXAM Chest X-Ray** is marked "YES" if the equipment was used in the exam.

The third section contains information on supplies used to conduct the exam, with information about their output, average monthly utilization, and unit price.

### A.4.6 BED-DAY: FILE FOR CALCULATING COSTS

General information regarding bed occupation in the facility will be obtained from hospital records. The files include general information on hospitalizations. The occupied bed-days for 2006 correspond to occupation of a bed in the facility by a patient being diagnosed, treated, or followed for a health problem using hospital facilities. This is the same data as recorded in the **Facility file (2)**.

The **Average number of available beds during the year** corresponds to the number of available beds during the year. The figure is an average because the number of beds can increase (new beds purchased) or decrease (bed sent out for maintenance) from month to month. This figure is the same as the one recorded in the **Facility (2)** file.

Finally, the **Total expenditure on services 2006 (S/.)** is recorded, to calculate the average cost of a bed-day.

## A.5 DATA ENTRY AND CODING

The process of data entry consists of entering the information from the questionnaires into computers. To do this, we will use the same Excel files that we use to print the questionnaires. For each facility, we will make a new copy of the Excel file, labeling it with the facility's name.

Normally, during data entry we will enter exactly what is written on the questionnaire. However, there are always exceptions.

# APPENDIX D: NOTES ON FIELD DATA COLLECTION

We planned to collect data in three regions during the first two weeks of December (December 3-14). Although this stage began according to plan, we encountered unforeseen difficulties in the field that prolonged the data collection task.

The main problem was the occurrence of labor strikes by health professionals. The strikes significantly reduced the number of medical staff in the facilities, making it difficult to conduct the guided visits. In addition, the administrative personnel had additional end-of-the-year tasks, such as working on the operating plan for the following year. Therefore, the staff was also less available to supply the required information.

Finally, each facility has its own administrative protocols that did not necessarily fit our interview tool. Our efforts to adjust the tool after the Lima pilot study facilitated data collection; however, other differences in format of available information were not foreseeable.

In any case, the interviewers were able to obtain valuable information from the facilities.