



Ministry of Health, Mongolia

Asian Development Bank

Technical Assistance Project - 4123

Hospital Services Costing Study in Mongolia

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Acronyms

ADB	Asian Development Bank
ALOS	Average length of stay
DI	Diagnostic imaging
DMS	Directorate of Medical Services, MOH
ECG	Electrocardiography
EEG	Electroencephalography
ENT	Ear Nose and Throat
FTE	Full time equivalent
HSR	Health sector reform
ICU	Intensive care unit
MCHRC	Maternal and Child Health Research Center
MOH	Ministry of Health
N	Number
NCC	National Cancer Center
NIDRC	National Infectious Disease Research Center
PSFML	Public Sector Financial Management Law
RDTC	Regional Diagnostic and Treatment Center
SSIGO	State Social Insurance General Office
TA	Technical Assistance
TB	Tuberculosis
USI	Ultrasound investigation

Executive summary

A. Introduction

Mongolia is undertaking a reform initiative to improve the performance of public organizations. Performance based budgeting, a key component of the reform process, implies that public organizations like state hospitals will have to be funded based on the quality, quantity and costs of outputs delivered to population. This new approach was reinforced by the Public Sector Financial Management Law enacted in 2003.

The implementation of performance based contracting requires accurate data on the unit cost of services by type of service and level of facility. This information was not available in Mongolia⁴ across the range of hospitals and the goal of this study is to fill this gap in information.

Cost analysis is an essential tool relating the inputs of resources in monetary terms to the outputs of services provided by the hospital. Timely, reliable and good quality cost information is part of the basic information needed by managers and policy makers for making decisions about how to improve the performance of hospitals and where to allocate the resources within or among hospitals. Also, it allows for performance comparison between different hospitals.

On the request of the Mongolian Ministry of Health, health facility costing exercise was conducted with the technical assistance team from the Asian Development Bank “Support to Health Sector Reform project 4123” The study was organized from March 2004 to March 2005.

B. Objectives

This study has three main objectives.

The first is the following:

- Providing reliable and consistent estimation of the “true costs” of hospital services
- Providing information that can help hospital managers improve the efficiency and performance of their hospitals
- Providing data that can support developing the output based budgeting
- Providing data that can inform and improve provider payment mechanisms

The second objective is to develop a transparent methodology that is applicable to all hospitals. As part of this study we developed a set of guidelines taking into account international literature and the situation in Mongolia⁵. These guidelines provide a

⁴ A few hospital costing studies have been carried out in Mongolia prior to this study

⁵ A.K. Nandakumar et al. *Guidelines for Costing Hospital Outputs/Services in Mongolia*, ADB TA 4123 Support to Health Sector Reform

consistent framework and methodology that can be used by hospital managers to organize and analyze costs and outputs in the future.

The third objective was to create local capacity to in conducting such studies including the collection of data, data analysis, and interpretation of findings and use of findings at facility level.

Unit costs were calculated:

- By outpatient departments
- By inpatient departments
- For Ambulance service
- For Outreach services

The entire study was conducted under the supervision and guidance of The Steering Committee and the Ministry of Health. They were kept informed at each stage of the exercise and whenever specific issues arose – with methodology, data, and interpretation – their advice was sought and decisions made in keeping with their suggestions. From the Ministry of Health Dr. B. Bulganchimeg was the day-to-day supervisor. A research team composed of people from the Ministry of Health, hospital managers, accountants, economists and statisticians was established and the research team conducted the actual study. Extensive consultations were held with experts within and outside the Ministry of Health on key technical and data issues. To that extent this has been a collaborative process with special attention paid to key stakeholder approval for the methodology and findings.

C. Data

This study collected data from a national sample of hospitals. Based on consultations with the Ministry of Health it was decided to select one Aimag from each region and Ulaanbaatar. The final sample included 9 Soum hospitals, 3 Intersoum hospitals, 1 Rural general hospital, 4 Aimag general hospitals, 1 District general hospital, 1 Regional Diagnostic and Treatment Center, 4 single specialty centers and 2 multi-specialty hospitals from tertiary levels.

D. Methodology

We present a brief overview of the methodology in this section. A detailed description of the methodology is contained in the Hospital Costing Guidelines manual referred to earlier. The costing guidelines conform to the following principles:

- The costing process should be transparent
- The methodology should be replicable at the level of the hospitals and to the extent possible make use of existing data
- The full cost of services delivered should be calculated
- Costs should be allocated and apportioned using a consistent set of rules at all levels of hospitals

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- The methodology should be one that once institutionalized will permit hospitals to report unit costs on an annual basis.

The methodology used to calculate unit costs is the “step down” cost accounting. The main principle of the methodology is as follows:

- Each hospital and outpatient facility is structured into cost centers: overhead; intermediate service; and direct service or patient care.
- All line item costs of the hospital such as salary, drugs, food, heating, electricity etc., are defined and assigned as direct and indirect costs.
- Direct costs are then allocated to each of the cost centers and indirect costs are allocated to cost centers based on allocation rules.
- Once we have the line items fully allocated to the cost centers step down accounting to allocate overhead cost center costs to support services and direct service cost centers. Then the fully loaded support service cost center costs are allocated to direct service cost centers.
- At the final stage the unit costs are calculated by dividing the fully loaded costs of the direct cost centers by service utilization numbers like admission, visits, ambulance calls and number of surgeries.

E. Summary of Key Findings

This study represents the first time a systematic assessment was undertaken of the cost of inpatient care using a sample of hospitals from the primary, secondary and tertiary levels. A number of key findings emerged from the study that we believe have important implications for how services are organized and paid for. This is particularly relevant given that Mongolia has decided to transition to performance based budgeting and contracting⁶.

Some of the key findings are as under:

1. Using information to improve facility performance is a concept and capacity that has yet to become part of the culture at the national, regional and facility level. Having said this there is the human capacity in terms of well-trained facility managers, accountants, economists and statisticians to make this happen. What is lacking is the training in these new skills supported by changes to how health care is financed and paid for in Mongolia.
2. While not an explicit focus of this study we found that quality has yet to become integral to the service delivery system. In this regard we would point to some recent thinking on how patients’ experiences should be the

⁶ See guidelines 1 and 2 prepared under this TA Project

fundamental basis for defining quality⁷. We believe that it is important to build in tracking some key quality indicators into the information systems and to use this information for improving facility performance.

3. A number of important lessons emerged during the data collection exercise. These included among others:
 - The current format in which information is kept at the facility level is less than optimal to analyze and monitor the cost of services
 - Information was not always available at the desired level of detail. As example, data gaps existed in accounting costs by cost centers, registration of utilization of support services like laboratory tests and radiology exams by cost centers.
 - Because of how the hospital information systems are organized cost data are not always available from routine data systems. There is an emphasis on tracking expenditures by line items as this is the format required by the Ministries of Health and Finance. There is far less emphasis on creating data needed to improve the performance of a health facility
 - We also observed that there was a lot of variance in the availability of information across similar facilities

4. The pattern that emerges from the study is that the share of inpatient services to total costs increases with the level of the facility with at least half of all costs being spent on inpatient services at every level of facility. While this is true overall there were some Soum hospitals that spent more as a percentage of total costs on inpatient care as compared with some Aimag hospitals. We observed much less variability in percentage of total costs going to outpatient care across levels of facilities. Outreach services are provided mostly at the primary level and hence the share of this component is higher as a percentage of total costs at the primary level as compared with secondary level hospitals. Given that catchments area tend to much larger at the primary level share of ambulance services to total costs is also higher.

5. The cost per admission was 45,500 Tugricks at the Soum Hospital, 62,400 Tugricks at the Intersoum Hospital, 58,000 Tugricks at the Rural General Hospital, 88,800 at the Aimag and District General Hospital, 69,300 Tugricks at the RDTC and 103,000 at the Tertiary Hospital. One observes a fair amount of variance in the cost per admission across hospitals in the same category and across hospitals across different categories. An interesting observation was that the weighted average cost per admission was higher at the Intersoum hospitals as compared with Rural General Hospitals even though the latter provide more complex care. The maximum cost per admission for Intersoum

⁷ The Institute of Medicine, a body of the U.S. National Academy of Sciences, has published a report called "Crossing the Quality Chasm." This provides a systems approach to quality. This report has been followed by a number of research papers including "A Users' Manual for the IOM's Quality Chasm Report," Donald M. Berwick, Health Affairs, Volume 21, Number 2

Hospitals was for infectious disease, for Aimag hospitals this was for TB related admission at one of the hospitals, for tertiary level hospitals this was related to admission to an ICU.

6. Costs per bed day range from 5,200 Tugricks at the Soum Hospital to 9,900 Tugricks at the Tertiary Hospital. Intersoum hospitals had on average, higher cost per bed day as compared with Rural General Hospitals. The average cost per bed day was lower at RDTC as compared with Aimag hospitals. As with the cost per admission we observed a fair amount of variance in the cost per bed day across similar facilities and across facilities at different levels.
7. The cost per outpatient visit was 1,000 Tugricks at the level of Soum Hospitals, 1,200 Tugricks at Intersoum hospitals, 1,500 Tugricks at the Rural Hospital, Aimag and RDTC and 2,800 Tugricks at the Tertiary Hospital. While one observes lower variance in the weighted average cost per outpatient visit across levels of facilities there is a significant amount of variance in unit costs within the same level of facility and by type of service within and across facilities.
8. Cost per ambulance call is highest at Soum and Intersoum hospitals. This is not surprising given the remoteness of Soum and Intersoum hospitals and the distance between these facilities and distances that needs to be covered to reach their target population.
9. The FTE doctor per bed is highest at Aimag/district hospitals, followed by Intersoum hospitals, tertiary hospitals, Regional General Hospital, Soum hospitals and RDTC. What is surprising is that FTE doctors per bed ranges from .05 to .20 at the Soum hospitals a four fold difference, from 0.13 to .23 at the Intersoum hospitals, from .15 to .27 at the Aimag hospitals and from .07 to .23 at the Tertiary Hospitals. The number of FTE nurses per bed is the highest at the level of the Soum hospitals, followed by Tertiary level hospitals, Aimag and General Hospitals, RDTC, Rural General Hospital and Intersoum hospitals. An interesting finding is that while in all hospitals the number of nurses per bed was greater than the number of doctors per bed the figure was very similar at the level of the Intersoum hospitals. The variance in staffing per bed and the fact that Aimag hospitals appear to have more FTE doctors and nurses per bed as compared with even tertiary hospitals probably indicated the need to take a closer look at staffing patterns at hospitals.
10. On average doctors saw 12,329 outpatient visits at the level of the Soum Hospital, 10,069 at the level of Intersoum hospitals, 2351 at the Rural General Hospital, 4927 at Aimag and district general hospitals, 4948 at RDTC and 4403 at the Tertiary Hospitals. Clearly the number of outpatient visits per doctor is significantly higher at the Soum and Intersoum levels. The average number of inpatient admissions per doctor was 1039 at Soum hospitals, 253 at Intersoum hospitals, 221 at Rural General Hospitals, 267 at Aimag and District Hospitals, 311 at RDTC and 197 at Tertiary hospitals. Once again UmnuldeIgar Soum hospital was the outlier with a reported 3085 inpatient admissions per doctor. However, it is important to keep in mind that there are outliers in both categories and these might have skewed findings. We did go back to the hospitals that were outliers to verify their figures. Based on discussion we decided against changing the numbers for this round of analysis.

However it is clear that there is a need for greater standardization and validation of data that is reported from facility level.

11. The findings with regards ALOS confirms earlier data that Mongolian hospitals have fairly long lengths of stay. The ALOS for Soum hospitals was 8.7, with a minimum of 7.8 days and a maximum of 10.1 days. For Intersoum hospitals the ALOS was 9.7 days with a minimum of 8.7 days and a maximum of 11.7, for Rural General hospital the ALOS was 9.8 days, for Aimag and District Hospitals the mean ALOS was 12.8 days with a minimum of 10.1 days and a maximum of 11.7 days, for RDTC the ALOS was 14.6 days and for Tertiary hospitals the mean ALOS was 13.1 days with a minimum of 7.8 days and a maximum of 19.5 days. The data shows that, on average, ALOS is higher at the secondary and tertiary level facilities as compared with primary level facilities. This is consistent with the fact that secondary and tertiary level hospitals tend to treat sicker patients and more complicated cases.
12. In terms of occupancy rates this was 65.1% for Soum hospitals, 47.7% for Intersoum hospitals, 82.2% for the Regional General hospital, 67.6% for Aimag and District hospitals, 82.1% for RDTC and 85.7% for Tertiary hospitals. Thus, occupancy rates are much lower at the Soum, Intersoum and Regional General Hospital as compared with occupancy rates at the Aimag, RDTC and Tertiary hospitals. However, if one were to analyze the variations in occupancy rates we find that for Soum hospitals in the sample occupancy rates ranged from a low of 34.6% to a high of 99.8%. For Intersoum hospitals the minimum occupancy rate was 40% and the maximum 58.5%, for Aimag and District General hospitals the minimum occupancy rate was 46.9% and the maximum 95.3% and for tertiary hospitals the minimum occupancy rate was 54.7% and the maximum 106.2%. While some hospitals are working at close to or in excess of full capacity it is clear that there is a large amount of unused bed capacity at hospitals especially at the Soum, Intersoum and Aimag levels⁸.
13. The bed turn over rate was 27.3 for Soum hospitals, 19.5 for Intersoum hospitals, 33.1 for the Rural General Hospital, 23.1 for Aimag and District hospitals, 26.8 for RDTC and 33.1 for Tertiary hospitals. Turnover rate at the tertiary level is highest which means than on average these facilities are performing well with relatively small proportion of unused beds. Regional diagnostic and treatment center shows low turn over rate and high occupancy rate, which is probably related to the fact of unnecessary long inpatient days.
14. An analysis of the relationship between average length of stay and the weighted average cost per admission showed that there is a strong positive relationship between average length of stay and the cost per admission.
15. To the extent that higher costs are incurred in earlier days of hospital admission, we would expect average cost per bed day to be negatively related to ALOS. However we observe that this is not the case for the hospitals in our study. In Mongolia there appears to be a positive relationship between average length of stay and the cost per bed day.

⁸ At the tertiary and RDTC level occupancy rates are comparable to similar facilities in other developing countries. This is based on an analysis of hospital costing studies.

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16. One might hypothesize that a higher occupancy rate would be associated with lower costs per inpatient bed day and per admission. This is because fixed costs such as staff salaries and depreciated value of capital assets would be spread over a larger number of admissions. However, we observe a weak but positive relationship between occupancy rate and the weighted cost per admission in the case of the hospitals in our sample.
 17. One thing this study did not do was verify whether the care provided was necessary or conformed to protocols or quality standards. However, during the course of the study research team members did examine a few patient records and there was anecdotal evidence that the treatment was either not necessary, could be done in a different setting (outpatient versus inpatient), or that protocols were not followed.

While there was anecdotal evidence about inefficiencies within the Mongolian hospital system this study attempts to quantify some key cost and efficiency indicators. The picture that emerges is one where there is room to improve the performance, and probably the need, to improve the public hospital sector in the country. There is excess bed capacity mainly at the primary and secondary levels, staff productivity can be improved, inpatient lengths of stay tend to be long, and resource allocation is not tied to either population needs or performance of the facility. Large variations exist in the cost and efficiency indicators across facilities at different levels, between facilities within the same level, and across departments within a particular facility. Tertiary hospitals appear to perform better on key efficiency indicators as compared with lower level hospitals. Some hospitals in our sample reported occupancy rates in excess of a hundred percent.

F. Recommendation

The structure of health systems tends to reflect historical factors, cultural values, past and current policies, and expectations of the population. During the socialist times Mongolia had a command and control economy that emphasized central planning, standardization and an emphasis on building health systems around large hospitals. Subsequently, as a first step to changing how health care was financed the country introduced social insurance and the SSIGO implemented a single flat rate payment to providers. This was most likely the correct first step to take. However, it is likely that this encourages keeping average costs high and emphasizing inpatient care at the expense of outpatient services. The research team also felt that the Mongolian population is accustomed to hospitalization and long stays at hospitals are associated with good quality care. This in turn results in longer than necessary lengths of stay and unnecessary hospitalizations.

We are aware that the Mongolian government and the Ministry of Health are moving to change and reform the health sector. Mongolia is transitioning from a centrally planned, managed and financed health care system to one that emphasized autonomy, population based planning, assuring access to the population to an Essential Package

of Health Services, improving information and accounting systems, and performance based budgeting and reimbursements⁹.

Based on the key findings from this study the team would like to make a few recommendations that we believe can improve the efficiency of the public hospital sector in Mongolia.

- We strongly believe that in order to better manage facilities, reduce costs and improve efficiency there is a need to significantly improve and strengthen cost accounting and data capture systems at the facility level. Investments will be needed to improve both availability and reliability of the required data. We hope the initiative to develop health management information systems will take into account some of the findings from this study even as it seeks to address such issue
- There is a need to introduce quality and efficiency indicators at the level of the facility. These indicators in turn should be linked to the output-based budgeting approach developed by the ADB TA project.
- Given that the average unit costs have built into them the inefficiencies observed at hospital levels reimbursing facilities using average costs might encourage more inefficient behavior at the facility level. Hence the value of this study is in helping to inform the discussion on how to reimburse facilities by quantifying costs and providing a comparison of costs and efficiency indicators across facilities.
- There is a need to invest in human capacity building. This will involve the training of hospital managers on how to use cost data to improve efficiency and better manage resources (human, financial and other) to produce quality health care that is responsive to patient needs.
- Link this study to the findings from the Costing of the Mongolian Essential Health Care Package¹⁰. The MEHCP costing study uses an input-output based approach to costing and develops some estimates of providing care that follow protocols. Comparing the ideal against the actual can be useful and informative.
- The Ministry of Health should consider introducing policies that encourage greater autonomy, provision of financial and non-financial incentives to service providers that encourage efficiency, strengthen outpatient and outreach services
- There is also a need to increase public awareness about good quality care, the importance of prevention and public health interventions and health life styles. Changes to the service delivery system will not be possible unless the consumer is willing to buy-into the notion that these changes are for their benefit.
- Last but not least there is a need to institutionalize the Hospital Costing efforts

⁹ See guides 1 and 2 produced under this TA

¹⁰ Conducted under the ADB TA Project

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- a. In order to the capacity at central and local levels and make progress to the implementation of the PSFML, introduce the Hospital output/service costing Guideline proposed by the TA project.
 - b. The study team does not recommend any single software that the Ministry of Health should adapt. A set of excel programs have been developed that will permit facilities to replicate the outputs produced for this study. Similarly, there is costing software that has been made available to the TA project by an international consultant assisting with the TA project. There is off-the-shelf software that is commercially available. We recommend that the Ministry of Health appoint a committee that can systematically evaluate and test the various alternatives and then make a decision of which to use.
 - c. While the software chosen is not important we would like to re-emphasize the importance of introducing a standardized approach to capturing relevant costs at the facility level. It is equally important to integrate concepts of costing into routine functions at all levels, train staff in the costing techniques, integrate key indicators into routine data capture systems, regular collection, analysis, validation and feedback of facility performance.

Hospital Services Costing Study in Mongolia

1. Introduction

Mongolia is undertaking a reform initiative to improve the performance of public organizations. Performance based budgeting, a key component of the reform process, implies that public organizations like state hospitals will have to be funded based on the quality, quantity and costs of outputs delivered to population. This new approach was reinforced by the Public Sector Financial Management Law enacted in 2003.

The implementation of performance based contracting requires accurate data on the unit cost of services by type of service and level of facility. This information was not available in Mongolia¹¹ across the range of hospitals and the goal of this study is to fill this gap in information.

Cost analysis is an essential tool relating the inputs of resources in monetary terms to the outputs of services provided by the hospital. Timely, reliable and good quality cost information is part of the basic information needed by managers and policy makers for making decisions about how to improve the performance of hospitals and where to allocate the resources within or among hospitals. Also, it allows for performance comparison between different hospitals.

On the request of the Mongolian Ministry of Health, health facility costing exercise was conducted with the technical assistance team from the Asian Development Bank “Support to Health Sector Reform project 4123”. The study was organized from December 2004 to March 2005.

2. Objectives

This study has three main objectives.

The first is the following:

- Providing reliable and consistent estimation of the “true costs” of hospital services
- Providing information that can help hospital managers improve the efficiency and performance of their hospitals
- Providing data that can support developing the output based budgeting
- Providing data that can inform and improve provider payment mechanisms

¹¹ A few hospital costing studies have been carried out in Mongolia prior to this study

The second objective is to develop a transparent methodology that is applicable to all hospitals. As part of this study we developed a set of guidelines taking into account international literature and the situation in Mongolia¹². These guidelines provide a consistent framework and methodology that can be used by hospital managers to organize and analyze costs and outputs in the future.

The third objective was to create local capacity to in conducting such studies including the collection of data, data analysis, and interpretation of findings and use of findings at facility level.

Unit costs were calculated:

- By outpatient departments
- By inpatient departments
- For Ambulance service
- For Outreach services

The entire study was conducted under the supervision and guidance of The Steering Committee and the Ministry of Health. They were kept informed at each stage of the exercise and whenever specific issues arose – with methodology, data, interpretation – their advice was sought and decisions made in keeping with their suggestions. From the Ministry of Health Dr. B. Bulganchimeg was the day-to-day supervisor. A research team composed of people from the Ministry of Health, hospital managers, accountants, economists and statisticians was established and the research team conducted the actual study. Extensive consultations were held with experts within and outside the Ministry of Health on key technical and data issues. To that extent this has been a collaborative process with special attention paid to key stakeholder approval for the methodology and findings.

3. Data

3.1. Levels of Hospitals

In Mongolia the term hospital does not always connote inpatient wards. In some instances hospitals only provide outpatient care. For purposes of this study we used the definition of the Ministry of Health.

1. Soum hospital generally has 10-15 beds. There are 305 Soum hospitals. This is the primary level hospital.

¹² A.K. Nandakumar et al. *Guidelines for Costing Hospital Outputs/Services in Mongolia*, ADB TA 4123 Support to Health Sector Reform

2. Intersoum hospitals are located in one of the Soums of an Aimag but serve the catchments area of population from several Soums. Intersoum hospitals have about 30 beds. There are 31 Intersoum hospitals. These hospitals provide primary level care.
3. Rural general hospital is larger than the Intersoum hospital. It has about 70 beds and more specialty departments. These also serve population from more than one soum. There are five rural general hospitals. Rural general hospital provides primary and some secondary level care
4. Aimag general hospitals have more than 100 beds and serve all Soums in an Aimag. This is a secondary level hospital. Soum, Intersoum and Rural general hospitals refer to this hospital though in practice people bypass lower level facilities and come directly to Aimag general hospitals. There are 21 Aimag general hospitals.
5. District hospitals are located in Ulaanbaatar. There are 12 district hospitals and these serve the urban population in Ulaanbaatar. Some of these do not have beds. It is the secondary level hospital.
6. Regional Diagnostic and Treatment Centers (RDTC): Some of the Aimag general hospitals were converted into regional diagnostic and treatment centers. This was in keeping with the regional development concept. These offer a wider variety of services and have better equipment; and better-trained staff. There are 3 such facilities.
7. Multi-specialized medical care hospitals: These are tertiary hospitals and are all located in Ulaanbaatar. There are three of them.
8. Single specialty tertiary medical care hospitals: These are tertiary hospitals that offer only one type of service like maternity and child, infectious diseases, cancer, trauma mental disease etc. There are 7 of them and these are all located in Ulaanbaatar.

3.2. Study Sample

This study collected data from a national sample of hospitals. Based on consultations with the Ministry of Health it was decided to select one Aimag from each region and Ulaanbaatar. The final sample included 9 Soum hospitals, 3 Intersoum hospitals, 1 Rural general hospital 4 Aimag general hospitals, 1 District general hospital, 1 Regional Diagnostic and Treatment Center, 4 single specialty centers and 2 multi-specialty hospitals from tertiary levels.

Table 1: Distribution of sample health facilities in survey by type and by geographic region

Facilities	Dundgobi Aimag	Zavkhan Aimag	Ovorkhangai Aimag	Selenge Aimag	Khentii Aimag	Ulaanbaatar	Total
Soum hospitals	2	2	0	2	3	0	9
Intersoum hospitals	1	1	0	1	0	0	3
Rural general hospitals	0	0	0	1	0	0	1

Aimag/District general hospitals	1	1	0	1	1	1	5
Regional diagnostic and treatment centers	0	0	1	0	0	0	1
Single specialty centers	0	0	0	0	0	4	4
Multi specialty centers	0	0	0	0	0	2	2
Total	4	4	1	5	4	7	25

4. Methodology

We present a brief overview of the methodology in this section. A detailed description of the methodology is contained in the Hospital Costing Guidelines manual referred to earlier. The costing guidelines conform to the following principles:

- The costing process should be transparent
- The methodology should be replicable at the level of the hospitals and to the extent possible make use of existing data
- The full cost of services delivered should be calculated
- Costs should be allocated and apportioned using a consistent set of rules at all levels of hospitals
- The methodology should be one that once institutionalized will permit hospitals to report unit costs on an annual basis.

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The methodology used to calculate unit costs is the “step down” cost accounting. The main principle of the methodology is as follows:

- Each hospital and outpatient facility is structured into cost centers: overhead; intermediate service; and direct service or patient care.
- All line item costs of the hospital such as salary, drugs, food, heating, electricity etc., are defined and assigned as direct and indirect costs.
- Direct costs are then allocated to each of the cost centers and indirect costs are allocated to cost centers based on allocation rules.
- Once we have the line items fully allocated to the cost centers step down accounting to allocate overhead cost center costs to support services and direct service cost centers. Then the fully loaded support service cost center costs are allocated to direct service cost centers.
- At the final stage the unit costs are calculated by dividing the fully loaded costs of the direct cost centers by service utilization numbers like admission, visits, ambulance calls and number of surgeries.

4.1. Definitions of Cost Centers

Cost centers are centers of activity in the hospital to which the different costs will be assigned. We defined these cost centers or centers of activity in such a way that they correspond to the hospitals’ organizational and/or accounting structure. To guide us

in this process we used the regulation from the Ministry of Health on Hospital Operational and Organizational Standards.

Hospitals were divided into Overhead Cost Centers, Support service Cost Centers, and the Direct service Cost Centers.

Direct Service Providing Cost Center as the name suggests are those that provide direct patient care. An example would be an inpatient unit (ward) or an outpatient clinic.

Support Cost Centers are those that do not directly provide services but rather support direct service cost centers through ancillary services. Laboratory, diagnostic imaging, and pharmacy are examples of support cost center.

Overhead Cost Centers are those that assist both the support and direct service cost centers. The Administrative Unit at a hospital is an example of an overhead cost center.

For purposes of step down accounting these were therefore placed at first in the step down procedure¹³ followed by Support service cost centers, and finally director service cost centers.

Table 3: Illustrative List of Cost Centers

<i>Overhead cost centers</i>	<i>Support service cost centers</i>	<i>Direct Service Cost centers (This will vary by level of hospital and is illustrative)</i>
Finance and Administration	Kitchen	Inpatient:
Household and supplies	Sterilization	Internal medicine
Garage	Rehabilitation	Pediatrics
Engineering and maintenance:	Laboratory:	Surgery (general surgery, trauma, ophthalmology, ENT, maxillo-facial surgeries)
<i>Medical equipment maintenance</i>	<i>Clinical</i>	Obstetrics
<i>Building, utilities maintenance</i>	<i>Biochemical</i>	Gynecology
Hospital supportive economic units (livestock, vegetable husbandry)	<i>Immunology</i>	Obstetrics and gynecology
Cleaning and service (security, cleaning, waste disposal)	<i>Bacteriology</i>	Intensive care unit
Laundry	Diagnostic imaging:	Neurology and psychiatrics disease
Other	<i>X-ray</i>	Traditional medicine
	<i>USI</i>	Dermatology
	<i>Endoscopies</i>	TB
	ECG	Infectious disease
	EEG	Other
	Morgue	Outpatient:
	Blood bank	Internal medicine
	Medical records unit	Neurology
	Pharmacy	Pediatrics
	Other	Gynecology
		Psychiatrics
		Ophthalmology
		ENT

¹³ The step down accounting methodology makes the assumption that costs flow only in one direction

Reproductive Health
 General surgery and trauma
 Traditional medicine
 TB
 Dermatology
 Dentistry
 Maxillo-facial surgery
 Oncology
 Infectious diseases
 Other

Other Direct Service cost centers:
 Ambulance care
 Outreach activities

4.2. Line item costs

Information on line item costs were obtained at the level of the facility. We found that estimating total line item costs was relatively easy for some categories but very difficult for others. This was especially true with regards drugs and medical supplies and asset costs. For most of the line item costs expenditures recorded in the financial statements of the hospital are taken as costs.

Cost of staff: The cost of staff consists of various components: the base salary, a series of bonuses and allowances (over-time allowances, professional qualification allowance, working conditions allowances, travel allowances, tuition fees for the staff's children) and the employer's contribution to social security.

Cost of drugs and medical supplies: Except for drugs prescribed in outpatient departments, the hospital is responsible for the purchase and delivery of all drugs and medical supplies. In addition to the amount in the hospital budget we have included the value of drugs and medical supplies provided by National Programs and donations, international and domestic.

Cost of utilities: This covers costs for electricity, water, and heating. Cost information for electricity, water and heating taken from the hospital general ledger and represents invoices from organizations provided these services. As for the water and sewage costs of soum, Intersoum and Rural general hospitals, there were little or no record of costs as they are not connected to central water supply system. This was not the case for hospitals in Ulaanbaatar or in Aimag centers. Heating costs for Soum, Intersoum and Rural general hospitals consists mainly of the cost of animal dung, coal, and wood for ordinary stoves.

Cost of other recurrent items: This includes all other costs such as stationary, transport and communications, domestic travel, books and subscriptions, training and seminars, research and development, purchase of household inventories and materials for facility, uniforms and linen, recurrent maintenance payments, fees and insurance, one time benefit and remuneration and other recurrent expenditures. The estimation of total costs for these line items was computed in consultation with hospital accountants.

Depreciated Cost of assets: In addition to the recurrent costs we have included the depreciated capital cost of assets such as building, equipment and furniture used for delivering health care service. We used to re-evaluation value that came from the asset inventory conducted at all public organizations in 2003. The total re-evaluation value then was multiplied by the annual depreciation rate that was provided by the Ministry of Finance.

4.3. Assigning line item costs as direct and indirect costs

Once the costs of all line item costs have been defined, we categorized all costs as direct and indirect. **Direct costs** are those that can be attributed directly to a cost center without using any allocation rules. **Indirect Costs** are those that cannot be directly allocated to a cost center but rather are shared by a number of cost centers. Indirect costs have been allocated to the different cost centers using a set of rules.

Table 4: Line item costs are shown as direct and indirect costs

	Line items	Direct costs	Indirect costs
1	Base salary	×	
2	Additional allowances and increments	×	
3	Social insurance contribution paid by employer	×	
4	Stationery		×
5	Electricity		×
6	Heating		×
7	Water and sewage		×
8	Transport and fuel	×	×
9	Communications and postal	×	
10	Domestic travel		×
11	Purchase of household inventories and materials for facility.		×
12	Uniforms and linen		×
13	Drugs and medical supplies	×	
14	Food		×
15	Depreciation of assets	×	

4.4. Allocating direct and indirect costs to cost centers

The above categorized direct and indirect costs were then allocated to the cost centers according to the rules described in Table 5. These rules were developed during the preparation of “Hospital service/output costing Guideline” by the TA project. The allocation rules were developed in consultation with hospital administrators and accountants. In spite of this during the implementation of this study we had to make certain adjustments to some allocation rules as the data was not available at the level of the facility. This is not an uncommon occurrence and it is our hope that once hospitals become familiar with costing and cost accounting concepts a hospital information system will be developed to meet the information required for allocation rules.

Table 5: Allocation rules for line item costs

<i>Category</i>	<i>Allocation rule to be followed</i>
Base salary	<ul style="list-style-type: none"> Allocate on the basis of proportion of staff time spent for each cost center. This came out as result of process described below.
Additional allowances	<ul style="list-style-type: none"> Identify by person and then allocate to cost center
Social insurance contribution	<ul style="list-style-type: none"> Identify by person and then allocate to cost center
Stationery	<ul style="list-style-type: none"> Allocated based on the number of full time equivalent staff in each department
Electricity	<ul style="list-style-type: none"> Allocated to cost centers by floor area
Heating	<ul style="list-style-type: none"> Allocated to cost centers by floor area
Water and sewage	<ul style="list-style-type: none"> Allocated to cost centers by floor area
Transport and fuel	<ul style="list-style-type: none"> Allocate to administrative cost center (tertiary hospitals) Assign 30% of costs to administrative cost center and 70% to emergency cost center (secondary hospitals and primary providers)
Communications and postal	<ul style="list-style-type: none"> Allocate it to administration and finance cost center
Domestic travel	<ul style="list-style-type: none"> Allocated based on the number of full time equivalent staff in each department
Purchase of household inventories and materials	<ul style="list-style-type: none"> Allocated by floor area
Uniforms and linen	<ul style="list-style-type: none"> By number of full time equivalent staff by cost center
Drugs and medical supplies	<ul style="list-style-type: none"> Allocate to cost centers by actual use
Food	<ul style="list-style-type: none"> Allocated to inpatient cost centers on the basis of the number of bed days
Other recurrent expenditures	<ul style="list-style-type: none"> Allocate on the basis of allocated shares of all above items

4.5 Allocation of staff time and Salaries

The allocation of joint costs is something that has to be dealt with in costing studies. This is because a number of the staff works across cost centers. In another words, sometimes doctors or nurses work for both inpatient and outpatient departments or for departments of different specialties. In such cases, it is necessary to allocate staff time and salary to relevant cost center according to proportion of the time spent at that cost center.

Other costing studies have used “time motion”, “activity based sampling” and other methods to estimate and allocate joint time costs. We considered these options but given time and budget constraints decided to base use self-reported time allocation to assign costs across cost centers. We also consulted with accountants and department heads to confirm and verify what the staff had reported. We strongly recommend that in the future more rigorous methods of allocating joint time be used¹⁴.

4.6. Allocating overhead costs to support and direct service cost centers

Once all direct and indirect costs are allocated to cost centers we used step down cost allocation processes to allocate costs from overhead to other cost centers and from support to direct service cost centers. For such allocation we used a set of rules defined in the guidelines.

Table 6: Allocation rules for Overhead cost centers to other cost centers

<i>Overhead cost centers</i>	<i>Allocation Rule</i>
Administration and finance	<ul style="list-style-type: none">• By number of full time equivalent staff
Household and supplies	<ul style="list-style-type: none">• By number of full time equivalent staff
Cleaning and common services (cleaning and security, waste disposal)	<ul style="list-style-type: none">• By floor area of cost center
Garage	<ul style="list-style-type: none">• By floor area of cost center.
Maintenance	<ul style="list-style-type: none">• By floor area of cost center
Laundry	<ul style="list-style-type: none">• 30% allocated to intermediate cost centers and outpatient cost centers on the basis of the number of full time equivalent staff• 70% allocated to inpatient cost centers in proportion to number of bed days

¹⁴ Other studies have shown that self reported estimates of time tend to under-estimate time spent on administrative duties or “down time.” They tend to over-estimate time spent on clinical activities

After this stage, total cost of support cost centers (pertaining to support center and allocated portion of overhead costs) is allocated to direct service cost centers using allocations rules in the table below.

Table 7: Allocation rules for support cost centers to direct cost centers

<i>Support cost centers</i>	<i>Allocation rule</i>
Medical records /statistics unit/	<ul style="list-style-type: none"> Allocated by number of visits and admissions
Admissions	<ul style="list-style-type: none"> Allocated by number of patients admitted to inpatient cost centers
Laboratories	<ul style="list-style-type: none"> Allocated by number of tests ordered by direct cost center
Diagnostic Imaging (includes USI, X-ray, Endoscopy, ECG,EEG)	<ul style="list-style-type: none"> First allocate to outpatient and inpatient, ambulance and other cost centers by number of examinations ordered from each direct cost center. Then to which exact inpatient and outpatient cost centers are allocated is based on the observation of DI cost center staff. (secondary and primary health facilities) Allocated by number of tests ordered by direct cost center (tertiary level hospitals)
Pharmacy ¹⁵	<ul style="list-style-type: none"> By proportion of costs of drugs and medical supplies allocated to each cost center
Sterilization	<ul style="list-style-type: none"> By number of inpatient bed days and outpatient visits (secondary and primary health facilities) By number of actual the utilization of package of equipment and materials sterilized by cost center (tertiary level hospitals)
Morgue	<ul style="list-style-type: none"> By number of admission
Rehabilitation	<ul style="list-style-type: none"> By number of inpatient bed days and outpatient visits (secondary and primary health facilities) By number of persons referred by direct cost center (tertiary level hospitals)
Kitchen	<ul style="list-style-type: none"> By number of inpatient bed days by direct cost center

4.7. Calculation of unit costs

Once the costs of all overhead and support cost centers are allocated we have fully loaded costs of each direct service cost centers. Each unit cost is calculated by dividing the direct cost center's total cost (after step-down allocation) by the appropriate utilization (admission, visits, bed days, ambulance calls, outreach visits).

5. Data collection and cleaning

A research team consisting of health economists, accountants, some hospital personnel, and staff from the Ministry of Health was established to carry out this study. The research team was in turn sub-divided into twelve teams of three persons each. During the first training workshop the research team was trained in the methodology, data sources, and potential problems with obtaining data and how to deal with these issues. After the initial training the research team participated in the field testing of the survey instruments at the Songinohairkhan district hospital and sample hospitals. Based on the feed back from the field testing the survey instruments were finalized. At this stage a second training workshop was conducted for the research team where complete guidance was given on how to conduct the data collection exercise, interview staff regarding time allocation, verification of data and other topics. The research team then carried out the actual data collection exercise. It took on average 3-5 days per facility to collect data. Data was collected for the year 2003. *We would like to acknowledge the contributions of hospital directors, accountants, and other key personnel at the facility, Aimag and national level in making this study a success. Without their active participation and guidance this study would not have been possible.*

A number of important lessons emerged during the data collection exercise. These included among others:

- The current format in which information is kept at the facility level is less than optimal to analyze and monitor the cost of services
- Information was not always available at the desired level of detail. As example, data gaps existed in accounting costs by cost centers, registration of utilization of support services like laboratory tests and radiology exams by cost centers.
- Because of how the hospital information systems are organized cost data are not always available from routine data systems. There is an emphasis on tracking expenditures by line items as this is the format required by the Ministries of Health and Finance. There is far less emphasis on creating data needed to improve the performance of a health facility
- We also observed that there was a lot of variance in the availability of information across similar facilities

We strongly believe that in order to better manage facilities, reduce costs and improve efficiency there is a need to significantly improve and strengthen cost accounting and

data capture systems at the facility level. Investments will be needed to improve both availability and reliability of the required data. We hope the initiative to develop health management information systems will take into account some of the findings from this study even as it seeks to address such issue.

Data cleaning was conducted by the member of the research team. On the whole, the research team was able to get most of the data required for the study. There were certainly many issues related to data reliability, accuracy and completeness as one would encounter in any first time study of this nature. These kinds of problems took a lot of time and effort to resolve both during the data collection, data cleaning, and data analysis. Therefore, data validation was one of the key challenges that we faced during this study.

Expenditure and Revenue data: Information on the recurrent costs by line item could be found in the financial statement of the hospital. This was readily available with the hospital accountant and all survey sites provided this data. However, there is some expenditure that was not recorded in the official statements of the hospitals. This included items such as drugs and medical supplies and equipment donated to the facility by international or public organizations or private bodies. We obtained information on these items from other sources and added them to the figures from the line item budgets kept at the hospital.

Staff salary and staff time allocation information: Each hospital had salary records on all staff. Although there is no recorded information about the hospital staff time allocation, we were able to get such data from all sample facilities. The method used here was direct interview with all staff at soum, Intersoum, and rural general hospitals. However, given the time limitations information on staff time allocation for bigger hospitals was collected through interviews with relevant staff like personnel manager or head of departments. Hospital accountant in charge of salary and allowances had useful information on staff time especially for services provided outside the hospital as there is a record of travel allowances paid to the staff for this kind of work.

We checked the completeness of salary information with the assumption that once all cost centers had allocated floor space and equipment they should also have allocated staff time and their salary cost. In Ikh-Uul soum hospital of Zavkhan Aimag, although there is floor space and asset cost allocated to cost centers, there were no staff and hence no FTE data. This was due to the fact that the cost center did not function in 2003. FTE staff data were checked against the officially approved staff numbers of each cost centers. The salary costs were also checked against salary amount approved for each cost centers. Due to staff turnover, there were cases of double counting of staff and we made adjustments to the data to avoid this. Our experience was that a useful way to avoid errors and improve data quality was to talk directly to the head of each department.

Drugs and medical supplies: Most of the secondary and tertiary level hospitals had detailed information on drugs dispensed to each cost centers. Based on this information, we were able to get good quality data on drugs and medical supplies expenditure with assistance of the pharmacist. However, at the primary level hospitals

there are no records of such information even by major cost centers like inpatient and outpatient. In addition, Soum hospitals claimed that they do not have drugs and medical supplies incurred in the outpatient cost center. In such cases, interviewers had extensive discussions with hospital general doctors on types of drugs used for outpatient and outreach services and allocated a share from total expenditure to those cost centers.

Asset information: In addition to the recurrent costs this study covered capital or asset costs. Assets primarily included buildings, furniture, equipment and vehicles. This is probably the first such attempt in the health sector costing covering nationwide sample. In order to get asset costs we needed information on floor space, re-evaluated value or replacement value of each asset and annual depreciation rate. In 2003, all public organizations including hospitals conducted asset valuation. Therefore, it was relatively easy to get asset information from all survey sites by each cost centers. Each facility had an individual asset register which includes information like name and type of the equipment or furniture, year of purchase and value. Since public organizations do not depreciate their assets for this study we used the annual depreciation rate proposed by the Ministry of Finance from their draft guideline.

When getting the asset information we followed the logic that if there is a cost center there should be floor space and assets such as furniture and equipment. There were a number of cases that we found cost center with staff but no furniture or equipment shown against that cost center. We took up such issues the asset accountant of the hospitals. Most of the time the reason for this was that the relevant asset had been registered against some other staff or cost center. There were also situations where some cost centers had been allocated too big or small space compared to others. Such cases were checked with the engineer or support staff. Due to lack of heating capacity there were many empty and unutilized rooms at Soum hospitals. These rooms have been excluded from floor space information. Assets that are not used have not been included in the asset cost of cost centers.

Utilization Data: This information is about the services provided from hospitals. Below is the table showing the collection of data on utilization. As we see, Soum, Intersoum, Rural general and Aimag/district hospitals did not report complete data on utilization. This was due to the fact that routine statistics do not capture information on laboratory and diagnostic imaging tests by various direct service departments. Similarly, no laboratory tests were performed at some of the Soum hospitals. As for tertiary hospitals we had go through the laboratory technicians daily records in order to get information on laboratory and diagnostic imaging tests.

We have to note here that due to inconsistency of the system used at hospitals to calculate inpatient admissions, it was difficult to rely on admissions numbers especially for some cost centers. This was particularly the case of departments such as ICUs that have a high internal movement of patients. According to the hospital statisticians the Ministry of Health also changes the formula to calculate some utilization data like admission from one year to another. This in turn makes it difficult to track utilization information longitudinally using a consistent set of rules. We had extensive discussions with MOH officers in charge of data and information issues and used appropriate formula suggested by them for this study.

Another important point to note is the difficulty in getting accurate data on outreach visits for primary and secondary level facilities. This information was not only difficult to find from current routine statistics forms at the facility level but where available the reliability was questionable. Therefore we consulted with Statistics Departments of the NHDC and MOH and based on their suggestion decided to use the following rule:

- At primary level of hospitals outreach visits would include home active visits and visits on the request of patients.
- At secondary hospitals we took 20 percent of all preventive or precautionary visits as outreach visits.

Such approximation is useful when you do not have any data, but will affect the accuracy of unit cost calculation. In the future, the MOH should develop common definitions for what is regarded as outreach service and try to capture this information within routine health statistics system.

Table 2: Data collection status, by levels of care and by Aimag

	Soum hospitals	Intersoum hospitals	Rural general hospitals	Aimag/District general hospitals	Regional diagnostic and treatment centers	Single specialty centers	Multi specialty centers
Dundgobi Aimag	90%	90%		90%			
Zavkhan Aimag	90%	90%	90%	100%			
Ovorkhangai Aimag					100%		
Selenge Aimag	90%	90%		90%			
Khentii Aimag	90%			90%			
Ulaanbaatar				100%		100%	100%

6. Results

In this section we provide the key results of the study. The results will be shown in terms of total cost allocation, unit costs of different cost centers by level of health facilities as well comparisons among same level of facility.

5.1. Comparisons across levels of care providers

5.1.1. Total Costs

Table 8 gives the overall distribution of costs by main services provided for each level of hospitals. On average Soum hospitals spent 53% of their total costs on inpatient care, 18.1% on outpatient care, 10.9% on outreach services and the remaining 19% on Ambulance Services. Intersoum hospitals spent 56.9% on inpatient care, 24.3% on

outpatient care, 8.4% on outreach services and 10.4% on ambulance services. Rural general hospitals spent 65.2% on inpatient care, 20% on outpatient care, 3.5% on outreach services and 11.3% on ambulance services. Aimag and District General Hospitals spent 67.5% of their costs on inpatient care, 23.9% on outpatient care, 1.5% on outreach services, and 7% on ambulance services. Regional D&T Centers spent 70.1% of their costs on inpatient care, 22.1% on outpatient care, 1.4% on outreach services and 6.4% on ambulance services. Finally, Tertiary level hospitals spent 85% of their costs on inpatient care and 15% on outpatient care.

The pattern that emerges from these results is that the share of inpatient services to total costs increases with the level of the facility with at least half of all costs being spent on inpatient services at every level of facility. While this is true overall there were some Soum hospitals that spent more as a percentage of total costs on inpatient care as compared with some Aimag hospitals.

We observed much less variability in percentage of total costs going to outpatient care across levels of facilities. Outreach services are provided mostly at the primary level and hence the share of this component is higher as a percentage of total costs at the primary level as compared with secondary level hospitals. Given that catchments area tend to much larger at the primary level share of ambulance services to total costs is also higher.

Table 8: Total cost distribution by service type

	Soum Hospitals	Intersoum Hospitals	Rural general Hospital	Aimag District general hospitals	Regional D&T Center	Tertiary level Hospitals
Inpatient care						
N	9	3	1	5	1	6
Mean/annum	52.0%	56.9%	65.2%	67.5%	70.1%	85.0%
Std Deviation	6.9%	4.1%		10.4%		7.8%
Minimum	44.6%	54.3%	65.2%	49.4%	70.1%	79.5%
Maximum	63.7%	61.6%	65.2%	76.0%	70.1%	98.7%
Outpatient care						
N	9	3	1	5	1	6
Mean/annum	18.1%	24.3%	20.0%	23.9%	22.1%	15.0%
Std Deviation	3.2%	12.0%		11.4%		7.8%
Minimum	14.5%	15.0%	20.0%	16.4%	22.1%	1.3%
Maximum	25.2%	37.8%	20.0%	44.1%	22.1%	20.5%
Outreach service						
N	9	3	1	5	1	6
Mean/annum	10.9%	8.4%	3.5%	1.5%	1.4%	
Std Deviation	4.1%	4.6%		0.7%		
Minimum	5.6%	3.1%	3.5%	0.6%	1.4%	
Maximum	16.5%	11.4%	3.5%	2.4%	1.4%	

Ambulance care						
N	9	3	1	5	1	6
Mean/annum	19.0%	10.4%	11.3%	7.0%	6.4%	
Std Deviation	4.9%	5.3%		2.0%		
Minimum	9.9%	4.4%	11.3%	4.1%	6.4%	
Maximum	25.0%	14.1%	11.3%	9.9%	6.4%	

Table 9 provides the break down of costs by line items. For Soum hospitals the break down of costs was 43.1% for staff, 14% for drugs and medical supplies, 10.4% for utilities and 32.5% on other items. For Intersoum hospitals the break down was 37.4% on staff, 15.6% on drugs and medical supplies, 20.6% on utilities and 26.4% on other items. At Rural General hospitals 49.1% of costs are accounted for by staff, 15.6% by drugs and medical supplies, 10.3% by utilities and 25% by other items. For Aimag hospitals the break down is 33.4% for staff, 17% for drugs and medical supplies, 25.7% on utilities and the remaining 24% on other items. At RDTC 35.8% was spent on staff, 29.5% on drugs and medical supplies, 9.5% on utilities and the remaining 25.3% on other items. At the Tertiary hospital level 28.4% was spent on staff, 30.9% on drugs and medical supplies, 13.6% on utilities and 27.1% on other items. The analysis showed that barring Tertiary Hospitals, staff costs were the largest line item expenditure at the level of the facility. At the level of Tertiary Hospitals drugs and medical supplies accounted for the largest share of expenditures probably reflecting the complexity of care provided at these hospitals. Utility costs exceeded 20% of total costs at both the Intersoum and Aimag hospitals.

Table 9: Cost breakdown by main line items

Care providers	Total cost (percent)			
	Staff	Drugs and Medical Supplies	Utilities	Other
Soum hospitals	43.1%	14.0%	10.4%	32.5%
Intersoum hospitals	37.4%	15.6%	20.6%	26.4%
Rural general hospitals	49.1%	15.6%	10.3%	25.0%
Aimag & District general hospitals	33.4%	17.0%	25.7%	24.0%
RDTC	35.8%	29.5%	9.5%	25.3%
Tertiary level Hospitals	28.4%	30.9%	13.6%	27.1%

5.1.2. Unit costs

In the Table 10 below we show the summary of unit costs per admission, per bed day, per outpatient visit, per outreach visit and per ambulance call by level of facility. In order to make comparisons more reliable we have weighted average costs.

The cost per admission was 45,500 Tugricks at the Soum Hospital, 62,400 Tugricks at the Intersoum Hospital, 58,000 Tugricks at the Rural General Hospital, 88,800 at the Aimag and District General Hospital, 69,300 Tugricks at the RDTC and 103,000 at the Tertiary Hospital. While reading this table it is important to keep in mind that the minimum and maximum figures are for the cost per admission by department. One observes a fair amount of variance in the cost per admission across hospitals in the same category and across hospitals across different categories. An interesting observation was that the weighted average cost per admission was higher at the Intersoum hospitals as compared with Rural General Hospitals even though the latter provide more complex care. The maximum cost per admission for Intersoum Hospitals was for infectious disease, for Aimag hospitals this was for TB related admission at one of the hospitals, for tertiary level hospitals this was related to admission to an ICU.

Costs per bed day range from 5,200 Tugricks at the Soum Hospital to 9,900 Tugricks at the Tertiary Hospital. Intersoum hospitals had on average, higher cost per bed day as compared with Rural General Hospitals. The average cost per bed day was lower at RDTC as compared with Aimag hospitals. As with the cost per admission we observed a fair amount of variance in the cost per bed day across similar facilities and across facilities at different levels.

The cost per outpatient visit was 1,000 Tugricks at the level of Soum Hospitals, 1,200 Tugricks at Intersoum hospitals, 1,500 Tugricks at the Rural Hospital, Aimag and RDTC and 2,800 Tugricks at the Tertiary Hospital. While one observes lower variance in the weighted average cost per outpatient visit across levels of facilities there is a significant amount of variance in unit costs within the same level of facility and by type of service within and across facilities.

Cost per ambulance call is highest at Soum and Intersoum hospitals. This is not surprising given the remoteness of Soum and Intersoum hospitals and the distance between these facilities and distances that needs to be covered to reach their target population.

Table 10: Unit costs of services by category of care providers, ('000 Tugricks)

	Soum Hospital	Intersoum Hospital	Rural general Hospital	Aimag District general hospital	&Regional D&T Center	Tertiary level Hospitals
Cost per admission						
N	9	3	1	5	1	6
Weighted average	45.5	62.4	58.9	88.8	69.3	103.0
Std Deviation	16.4	386.7		205.3		126.3
Minimum	25.8	34.2	43.0	42.6	34.1	15.5

Maximum	73.6	1506.3	211.3	935.2	434.3	704.0
Cost per bed day						
N	9	3	1	5	1	6
Weighted average	5.2	6.9	6.6	8.5	6.8	9.9
Std Deviation	2.1	53.6		14.0		29.7
Minimum	2.8	3.5	4.1	4.3	2.5	4.4
Maximum	9.3	215.2	14.6	80.3	26.0	153.6
Cost per Outpatient visit						
N	9	3	1	5	1	6
Weighted average	1.0	1.2	1.5	1.5	1.5	2.8
Std Deviation	0.7	0.7		1.1		3.6
Minimum	0.6	0.8	0.8	0.6	0.4	0.4
Maximum	3.2	2.1	3.1	5.9	5.3	20.4
Cost per Outreach visit						
N	9	3	1	5	1	6
Weighted average	1.0	1.0	0.9	0.8	0.9	n/a
Std Deviation	0.5	0.4		0.3		n/a
Minimum	0.7	0.7	0.9	0.5	0.9	n/a
Maximum	2.5	1.3	0.9	1.4	0.9	n/a
Cost per Ambulance call						
N	9	3	1	5	1	6
Weighted average	11.5	6.6	4.5	6.4	6.3	n/a
Std Deviation	5.6	16.7		2.0		n/a
Minimum	4.5	2.6	4.5	3.4	6.3	n/a
Maximum	23.0	34.3	4.5	8.1	6.3	n/a

5.1.3. Staffing ratios

Staff is the one of the major inputs to the delivery of care. In Table 11 we present Full-time equivalent (FTE) doctors per bed, FTE nurse per bed and FTE total staff per bed ratios. These ratios are a way of measuring efficiency at hospitals.

The FTE doctor¹ per bed is highest at Aimag/district hospitals, followed by Intersoum hospitals, tertiary hospitals, Regional General Hospital, Soum hospitals and RDTC. What is surprising is that FTE doctors per bed ranges from .05 to .20 at the Soum Hospitals a four fold difference, from 0.13 to .23 at the Intersoum hospitals, from .15 to .27 at the Aimag hospitals and from .07 to .23 at the Tertiary Hospitals.

¹ All staff is shown in terms of FTE. Full time equivalent (FTE) staff in an activity shows the degree of involvement of staff in that activity. The FTE is recognized as good measurement indicator of staff utilization.

The number of FTE nurses per bed is the highest at the level of the Soum hospitals, followed by Tertiary level hospitals, Aimag and General Hospitals, RDTC, Rural General Hospital and Intersoum hospitals. An interesting finding is that while in all hospitals the number of nurses per bed was greater than the number of doctors per bed the figure was very similar at the level of the Intersoum hospitals. The variance in staffing per bed and the fact that Aimag hospitals appear to have more FTE doctors and nurses per bed as compared with even tertiary hospitals probably indicated the need to take a closer look at staffing patterns at hospitals.

Table 11: FTE Staff per bed ratios, by type of facility

	Soum Hospital	Intersoum Hospital	Rural General Hospital	Aimag & District general hospital	Regional D&T Center	Tertiary level Hospitals
Doctors per bed						
N	9	3	1	5	1	6
Mean	0.13	0.17	0.14	0.23	0.10	0.15
Std Deviation	0.05	0.06		0.05		0.06
Minimum	0.05	0.13	0.14	0.15	0.10	0.07
Maximum	0.20	0.23	0.14	0.27	0.10	0.23
Nurses per bed						
N	9	3	1	5	1	6
Mean	0.42	0.19	0.25	0.37	0.31	0.40
Std Deviation	0.16	0.04		0.07		0.16
Minimum	0.25	0.14	0.25	0.27	0.31	0.20
Maximum	0.70	0.23	0.25	0.43	0.31	0.63
Total staff per bed						
N	9	3	1	5	1	6
Mean	1.52	1.17	1.91	1.18	1.29	1.31
Std Deviation	0.28	0.22		0.38		0.45
Minimum	1.07	0.97	1.91	0.85	1.29	0.82
Maximum	1.90	1.40	1.91	1.62	1.29	2.03

In Table 12 we present information on the number of inpatient admissions and outpatient visits per doctor. This again is a measure of efficiency. On average doctors saw 12,329 outpatient visits at the level of the Soum Hospital, 10,069 at the level of Intersoum hospitals, 2351 at the Rural General Hospital, 4927 at Aimag and district general hospitals, 4948 at RDTC and 4403 at the Tertiary Hospitals. Clearly the number of outpatient visits per doctor is significantly higher at the Soum and Intersoum levels. However, it is important to keep in mind that there are outliers in both categories. As example, doctors at Umnudelgar Soum hospital reported 40904 outpatient visits per doctor per year and those at Hutul Intersoum hospital reported 23512 outpatient visits per doctor per year. The Rural General Hospital in our sample

had much lower number of outpatient visits per doctor and yet had the highest staffing ratio per bed.

The average number of inpatient admissions per doctor was 1039 at Soum hospitals, 253 at Intersoum hospitals, 221 at Rural General Hospitals, 267 at Aimag and District Hospitals, 311 at RDTC and 197 at Tertiary hospitals. Once again Umnuldalgar Soum hospital was the outlier with a reported 3085 inpatient admissions per doctor.

During the course of the analysis we went back to hospitals that were outliers to verify their figures and based on discussions decided to keep them as they were for this round of analysis. However, it is clear that there is a need for greater standardization and scrutiny of how data is captured and reported at the facility level.

Table 12: Outpatient visits and inpatient admissions per doctor

	Soum Hospital	Intersoum Hospital	Rural general Hospital	Aimag & District general hospital	Regional D&T Center	Tertiary level Hospitals
Outpatient visits per doctor						
N	9	3	1	5	1	6
Mean per year	12329	10069	2351	4927	4948	4403
Std Deviation	11506	11661		2229		1277
Minimum	4073	2685	2351	2981	4948	2294
Maximum	40904	23512	2351	8708	4948	5793
Mean per month	1027	839	196	411	412	367
Admission per doctor						
N	9	3	1	5	1	6
Mean/annum	1039	253	221	267	311	197
Std Deviation	1007	33		51		49
Minimum	234	221	221	193	311	159
Maximum	3085	287	221	316	311	282
Mean/month	87	21	18	22	26	16

5.1.4. Service Indicators

In this section we present information on a number of other efficiency indicators including the Average Length of Stay (ALOS), bed occupancy rate and bed turn over rate. The findings with regards ALOS confirms earlier data that Mongolian hospitals have fairly long lengths of stay. The ALOS for Soum hospitals was 8.7, with a minimum of 7.8 days and a maximum of 10.1 days. For Intersoum hospitals the ALOS was 9.7 days with a minimum of 8.7 days and a maximum of 11.7, for Rural General hospital the ALOS was 9.8 days, for Aimag and District Hospitals the mean ALOS was 12.8 days with a minimum of 10.1 days and a maximum of 11.7 days, for

RDTC the ALOS was 14.6 days and for Tertiary hospitals the mean ALOS was 13.1 days with a minimum of 7.8 days and a maximum of 19.5 days. The data shows that, on average, ALOS is higher at the secondary and tertiary level facilities as compared with primary level facilities. This is consistent with the fact that secondary and tertiary level hospitals tend to treat sicker patients and more complicated cases.

In terms of occupancy rates this was 65.1% for Soum hospitals, 47.7% for Intersoum hospitals, 82.2% for the Regional General hospital, 67.6% for Aimag and District hospitals, 82.1% for RDTC and 85.7% for Tertiary hospitals. Thus, occupancy rates are much lower at the Soum, Intersoum and Regional General Hospital as compared with occupancy rates at the Aimag, RDTC and Tertiary hospitals. However, if one were to analyze the variations in occupancy rates we find that for Soum hospitals in the sample occupancy rates ranged from a low of 34.6% to a high of 99.8%. For Intersoum hospitals the minimum occupancy rate was 40% and the maximum 58.5%, for Aimag and District General hospitals the minimum occupancy rate was 46.9% and the maximum 95.3% and for tertiary hospitals the minimum occupancy rate was 54.7% and the maximum 106.2%. While some hospitals are working at close to or in excess of full capacity it is clear that there is a large amount of unused bed capacity at hospitals especially at the Soum, Intersoum and Aimag levels¹⁶.

The bed turn over rate was 27.3 for Soum hospitals, 19.5 for Intersoum hospitals, 33.1 for the Rural General Hospital, 23.1 for Aimag and District hospitals, 26.8 for RDTC and 33.1 for Tertiary hospitals. Turnover rate at the tertiary level is highest which means than on average these facilities are performing well with relatively small proportion of unused beds. Regional diagnostic and treatment center shows low turn over rate and high occupancy rate, which is probably related to the fact of unnecessary long inpatient days. Overall, Mongolian hospitals have much longer stays of hospitalization compared to international standards.

¹⁶ At the tertiary and RDTC level occupancy rates are comparable to similar facilities in other developing countries. This is based on an analysis of hospital costing studies.

Table 13: Service indicators, by level of providers

	Soum Hospital	Inter soum Hospital	Rural general Hospital	Aimag & District general hospital	Regional Center	D&T Tertiary level Hospitals
ALOS						
N	9	3	1	5	1	6
Mean/annum	8.7	9.7	9.8	12.8	14.6	13.1
Std Deviation	0.7	1.7		2.3		4.6
Minimum	7.8	8.7	9.8	10.1	14.6	7.8
Maximum	10.1	11.7	9.8	15.2	14.6	19.9
Bed Occupancy rate						
N	9	3	1	5	1	6
Mean/annum	65.1%	47.7%	82.2%	67.6%	82.1%	85.7%
Std Deviation	22.7%	9.7%		22.5%		18.0%
Minimum	34.6%	40.0%	82.2%	46.9%	82.1%	54.7%
Maximum	99.8%	58.5%	82.2%	95.3%	82.1%	106.2%
Turnover rate						
N	9	3	1	5	1	6
Mean/annum	27.3	19.5	33.1	23.7	26.8	33.1
Std Deviation	9.1	3.3		8.8		11.4
Minimum	12.5	16.1	33.1	14.8	26.8	13.7
Maximum	40.0	22.7	33.1	33.0	26.8	45.8

40.0

22.7

Figure 1 analyzes the relationship between average length of stay and the weighted average cost per admission. As expected, there is a strong positive relationship between average length of stay and the cost per admission. All hospitals in the sample are included.

Figure 1: ALOS and Weighted Average Cost per Admission

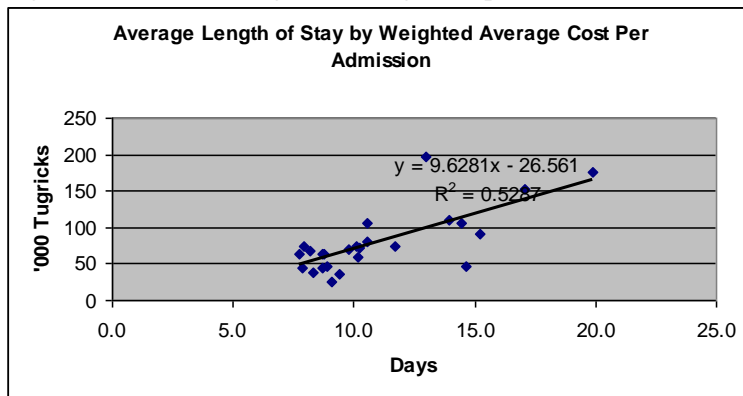


Figure 2 analyzes the relationship between average length of stay and the cost per bed day. To the extent that higher costs are incurred in earlier days of hospital admission, we would expect average cost per bed day to be negatively related to ALOS. However we observe that this is not the case for the hospitals in our study. In Mongolia there appears to be a positive relationship between average length of stay and the cost per bed day.

Figure 2: ALOS and Weighted Average Cost per Bed Day

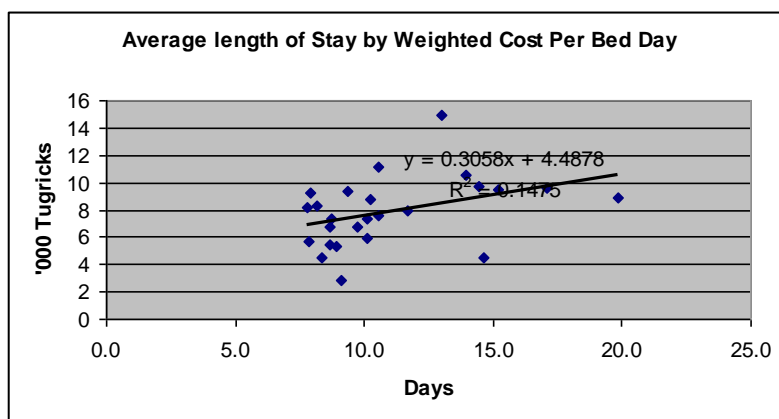
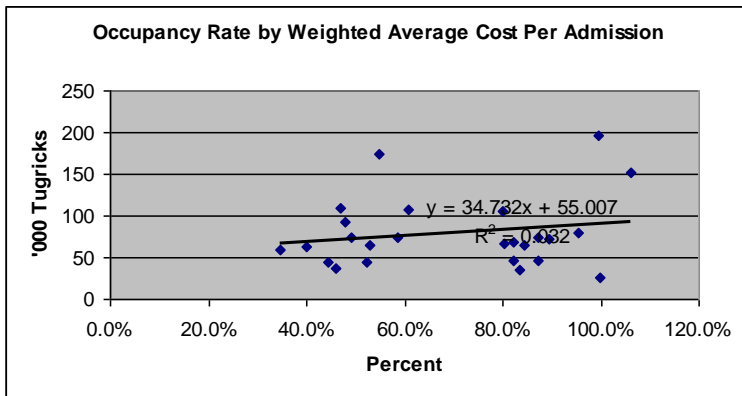


Figure 3 shows the relationship between occupancy rate and the weighted average cost per admission. One might hypothesize that a higher occupancy rate would be associated with lower costs per inpatient bed day and per admission. This is because fixed costs such as staff salaries and depreciated value of capital assets would be spread over a larger number of admissions. However, we observe a weak but positive relationship between occupancy rate and the weighted cost per admission in the case of the hospitals in our sample.

Figure 3: Occupancy Rate and Weighted Average Cost per Admission



5.2. Comparisons of costs within the level of care providers

In this section we compare key indicators across facilities within each of the three levels of hospitals.

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5.2.1. Primary level hospitals

Figure 4 shows the weighted cost of an inpatient admission for Soum and Intersoum hospitals. We observe large variances at sample primary level care providers. Weighted cost per admission ranged from 25,800 Tugricks at Binder hospital to 74,900 Tugricks at Hutul.

Figure 4: Cost per inpatient admission at Soum and Intersoum hospitals

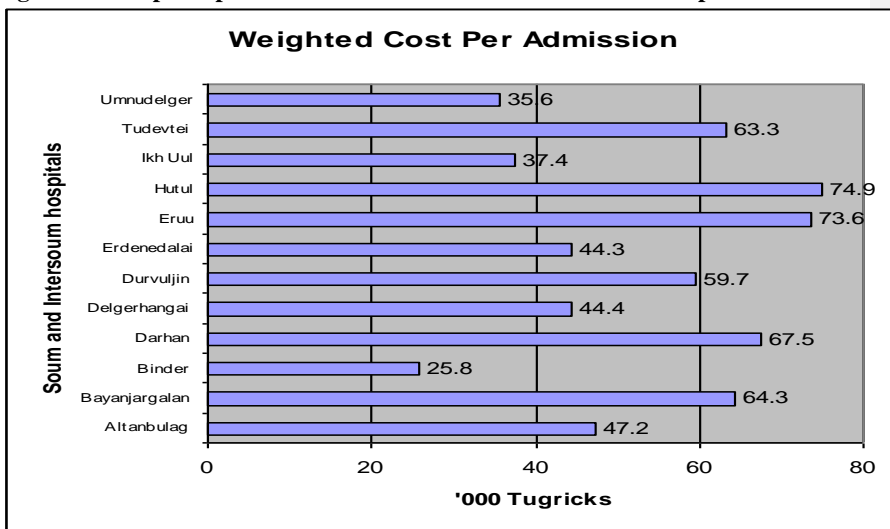


Figure 5 compares the relationship between occupancy rates and bed turn over rates. There is a strong positive correlation between occupancy rate and turn over rates. Hospitals that have low occupancy rate and low turnover rate are characterized by the excess bed capacity and are therefore inefficient. Hospitals such as Binder, Altanbulag, and Umnudelger Soum hospitals that have high turnover rate and high occupancy rate while having lower inpatient admission costs are more efficient hospitals compared to Eruu, Ikh-uul and Durvuljin Soum hospitals. All three Intersoum hospitals also show lower occupancy and turnover rates.

Figure 5: Soum and Intersoum hospitals by occupancy rate and turnover rate

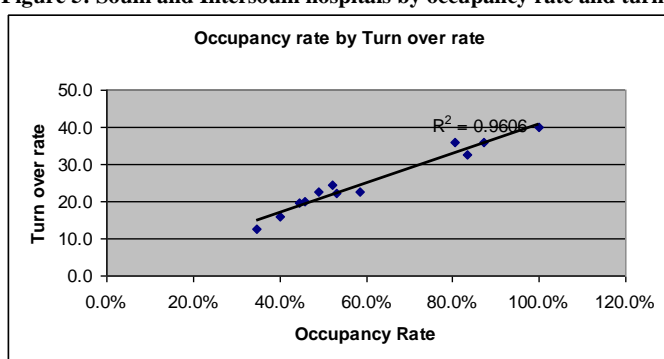


Table 14 shows the weighted cost per admission, cost per bed day, average length of stay, bed occupancy rate, and turnover rates for Soum and Intersoum hospitals. The cost per admission and cost per bed day are in thousand Tugricks. All hospitals have fairly long lengths of stay ranging from a low of 7.8 days to a high of 10.1 days. Five of the hospitals had occupancy rates of less than 50%, four had occupancy rates in excess of 80%, and the rest had occupancy rates between 50% and 80%. Clearly there is excess capacity at many of the Soum and Intersoum hospitals. While some of this might be explained by factors such as location and distance between the facility and target population the study points to the need to more closely examine how these hospitals are staffed and managed. This will become particularly important as the government moves toward performance based budgeting and contracting.

Table 14: Inpatient cost and service indicators for Soum and Intersoum hospitals

Soum and Intersoum hospitals	Weighted Cost per admission	Cost per bed day	ALOS	Bed occupancy rate	Turnover rate
Binder	25.8	2.8	9.1	99.8%	40.0
Umnudelger	35.58	3.79	9.4	83.5%	32.5
Ikh Uul	37.37	4.48	8.3	45.9%	20.1
Delgerhangai	44.4	5.66	7.8	52.2%	24.3
Altanbulag	47.2	5.3	8.9	87.2%	35.8

Erdenedalai *	51.4	6.03	8.7	44.5%	19.7
Durvuljin	59.65	5.88	10.1	34.6%	12.5
Bayanjargalan	64.3	7.34	8.8	53.0%	22.1
Darhan	67.5	8.25	8.2	80.4%	35.9
Eruu	44.3	5.4	81.	49.0%	22.6
Hutul*	74.9	8.0	9.4	58.5%	22.7
Tudevtei*	63.3	6.8	9.3	40.0%	16.1

*-Intersoum hospitals

The Table 15 shows the cost of an outpatient visit, outreach visit and ambulance calls at Soum and Intersoum hospitals. The highest cost for an outpatient visit is at Bayanjargalan Soum hospital and lowest at Delgerkhangai Soum hospitals. Cost of an outreach visit is similar to that of outpatient visits. Most outreach visits occur at the Soum hospitals because bagh feldshers are located in remote areas as community health care workers. Cost per ambulance call is highest at Tudevtei Intersoum hospital. The variance in the cost of an ambulance call is high ranging from a low of 4,500 Tugricks to a high of 34,300 Tugricks.

Table 15: Cost per outpatient visit, outreach visit and ambulance call ('000 Tugricks)

Soum and Intersoum hospitals	Cost per outpatient visit	Cost per outreach visit	Cost per Ambulance call
Altanbulag	0.8	0.7	4.5
Bayanjargalan	3.2	2.5	8.4
Binder	1.1	1.2	15.5
Darhan	0.8	0.8	13.2
Delgerhangai	0.6	1.1	23.0
Durvuljin	1.0	0.8	15.9
Eruu	1.8	1.5	4.8
Ikh Uul	1.2	1.3	16.8
Umnudelger	0.7	0.8	20.1
Erdenedalai	0.8	1.3	9.5
Tudevtei	2.1	1.3	34.3

At the level of Intersoum hospitals and above we were able to break down the indicators at the level of different departments. The results are summarized in Table 16. Cost per admission and the cost per bed day are in thousand Tugricks. We observe that the cost per admission is extremely high for admissions related to infectious

diseases. The average cost per admissions for infectious diseases ranges from a low of 84,300 Tugricks to a high of 1,506,000 Tugricks. This is because the beds meant for infectious diseases are empty most of the year. Similarly, the cost per admission at the Obstetrics and Gynecology department is also high at 86,700 Tugricks. Both the infectious disease and Obstetrics and Gynecology departments are characterized by low occupancy rates and low turn over rates.

Table 16: Inpatient unit costs, Cost per Bed Day, ALOS, Occupancy Rate and Turn over Rate

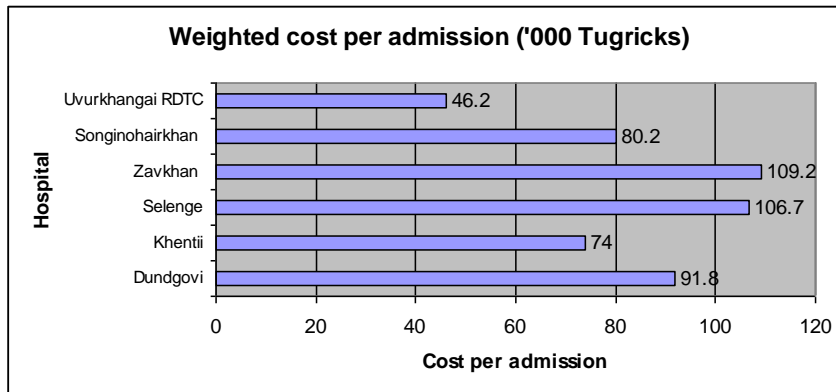
Intersoum hospitals	Cost center	Cost per admission	Cost per bed day	ALOS	Bed occupancy rate	Turnover rate
Erdenedalai	<i>Surgery</i>	49.8	7.1	7.0	44.1%	23.0
	<i>Internal Medicine</i>	36.2	3.5	10.3	65.8%	23.2
	<i>Obstetrics and gynecology</i>	43.1	6.8	6.3	41.2%	23.9
	<i>Pediatrics</i>	43.7	5.7	7.7	40.9%	19.3
	<i>Infectious Disease</i>	84.3	7.0	12.0	30.7%	9.3
Hutul	<i>Surgery</i>	78.5	12.9	6.1	47.6%	28.6
	<i>Internal Medicine</i>	54.3	5.2	10.4	115.4%	40.5
	<i>Obstetrics and gynecology</i>	108.4	11.2	9.7	42.4%	16.0
	<i>Pediatrics</i>	66.5	6.8	9.8	68.8%	25.5
	<i>Infectious Disease</i>	570.2	25.4	22.4	18.4%	3.0
Tudevtei	<i>Surgery</i>	61.3	7.5	8.1	56.5%	25.4
	<i>Internal Medicine</i>	54.2	4.6	11.8	58.5%	18.1
	<i>Obstetrics and gynecology</i>	108.7	13.7	7.9	21.5%	9.9
	<i>Pediatrics</i>	34.2	4.0	8.6	62.6%	26.6
	<i>Infectious Disease</i>	1506.3	215.2	7.0	1.0%	0.5
AVERAGE	<i>Surgery</i>	63.2	9.2	7.1	49.4%	25.6
	<i>Internal Medicine</i>	48.2	4.4	10.9	79.9%	27.3
	<i>Obstetrics and gynecology</i>	86.7	10.6	8.0	35.0%	16.6
	<i>Pediatrics</i>	48.1	5.5	8.7	57.4%	23.8
	<i>Infectious Disease</i>	720.3	82.5	13.8	16.7%	4.3

5.2.2. Secondary level hospitals

Figure 6 gives the weighted cost per admission for Aimag and District General Hospitals. We observe that the cost per admission is the highest at Zavkhan hospital followed by Selenge, Dundgovi hospital, Songinohairkhan, Khenti, and Uvurkhangai Regional Diagnostic and Treatment Center. What is interesting about the findings is

that Uvurkhangai RDTC where more advanced medical services are provided as compared with Aimag hospitals has the lowest cost per inpatient admission.

Figure 6: Weighted Cost per inpatient admission in Aimag/district general hospitals



From the Table 17 we observe that Khentii Aimag general hospital and Songinohairkhan District general hospitals had the highest occupancy rates as well as the highest turn over rates. The lowest occupancy rates were observed at Zavkhan hospital and Dundgovi Aimag general hospital. All costs reported here are in thousand Tugricks.

Table 17: Inpatient unit costs and Service Indicators

Aimag general hospital	Weighted cost per admission	Cost per Bed Day	ALOS	Bed occupancy rate	Turn-over rate
Khentii	61.8	6.8	10.1	87.2%	32.9
Songinohairkhan District	80.2	7.6	10.5	95.3%	33.0
Uvurkhangai RDTC	69.3	6.8	10.2	82.1%	26.8
Selenge	106.7	9.7	10	60.7%	21.3
Zavkhan	109.2	10.6	10.3	46.9%	14.8
Dundgovi	91.8	9.5	9.6	47.7%	16.2

Table 18 gives key outputs with regards outpatient visits, outreach visits and ambulance calls. The cost of an outpatient visit ranged from a low of 1,500 Tugricks at Selenge and Songinohiarkhan hospitals to a high of 2,700 Tugricks at the Khentii hospitals. With regards the cost of outreach visits this ranged from 500 Tugricks at Selenge hospital to 1,400 Tugricks at Zavkhan hospital. Ambulance call tends to be more expensive than either outpatient visits or outreach visits. This most likely represents the travel time and related costs to reach the target population.

Table 18: Cost per outpatient visit, outreach visit and ambulance call ('000 Tugricks)

Secondary level hospitals	Cost per outpatient visit	Cost per Outreach visit	Cost per Ambulance call
Dundgovi Aimag general hospital	2.3	1.0	7.0
Khentii Aimag general hospital	2.7	1.2	7.5
Selenge Aimag general hospital	1.5	0.5	8.1
Zavkhan Aimag general hospital	2.5	1.4	8.0
Songinohairkhan District general hospital	1.5	0.9	3.4
Uvurkhangai RDTC	2.0	0.9	6.3

Table 19 presents a summary of Aimag and district general hospital unit costs and other key indicators by inpatient cost centers. Intensive Care Units and the TB unit tend to be most expensive in terms of unit costs. The figures show that there is scope to improve the performance of a number of departments at these facilities. Overall these include, in addition to ICU and TB, departments of traditional medicine, and dermatology. Departments that appear to be functioning at near peak capacity include Internal Medicine, Obstetrics and Gynecology and Gerontology. In the Appendix 1, we attach the detailed Tables for Aimag/district general hospital inpatient unit costs and service utilization statistics.

Table 19: Summary of unit cost and service utilization statistics of different in patient cost centers by specialty, ('000 Tugricks)

Cost centers	Cost per admission					Cost per bed day					ALOS			Bed occupancy rate			Bed turnover rate		
	Weighted Average	Average	Median	Standard Deviation	Coef. Variation	Weighted Average	Average	Median	Standard Deviation	Coef. Variation	Average	Median	Standard Deviation	Average	Median	Standard Deviation	Average	Median	Standard Deviation
Internal medicine	73.6	76.0	73.9	12.1	0.2	6.6	6.7	7.0	1.3	0.2	11.5	10.8	1.2	77.0%	79.9%	19.1%	24.8	24.7	7.0
Pediatrics	71.4	72.6	73.9	9.9	0.1	7.9	8.0	8.1	1.0	0.1	9.1	9.1	0.2	66.6%	66.6%	24.4%	26.9	26.8	10.3
Surgery (general surgery, traumatology, ophthalmology, ENT, maxillo-facial surgeries)	78.7	81.9	82.4	18.0	0.2	9.0	10.1	9.6	3.3	0.4	8.5	8.1	2.1	66.5%	68.4%	10.8%	29.5	29.9	6.5
Obstetrics	95.0	96.1	96.1	25.0	0.3	12.3	12.3	12.3	1.2	0.1	7.8	7.8	1.3	92.7%	92.7%	6.3%	44.0	44.0	4.1
Gynecology	106.7	104.2	104.2	14.1	0.1	8.6	8.9	8.9	1.5	0.2	10.4	10.4	1.4	78.9%	78.9%	21.8%	27.5	27.5	4.1
Obstetrics and gynecology	84.9	84.1	84.1	8.8	0.1	10.5	10.4	10.4	0.8	0.1	8.1	8.1	0.2	60.5%	60.5%	7.3%	27.4	27.4	4.0
Intensive care unit	705.2	729.3	729.3	84.3	0.1	68.4	66.6	66.6	19.4	0.3	11.6	11.6	4.7	17.8%	17.8%	7.4%	6.6	6.6	5.0
Neurology and psychiatrics disease	97.0	91.0	85.6	17.3	0.2	8.8	7.9	8.0	2.0	0.2	11.7	11.3	1.5	64.5%	57.8%	22.5%	20.6	18.6	8.4
Traditional medicine	66.2	66.2	66.2		0.0	6.4	6.4	6.4		0.0	10.3	10.3		36.6%	36.6%		13.0	13.0	
Dermatology	102.0	141.1	188.1	85.3	0.8	9.9	13.2	16.1	7.9	0.8	10.5	10.0	1.0	30.6%	19.6%	25.7%	11.0	7.2	9.7
TB	381.4	549.6	414.0	338.8	0.9	7.4	11.5	9.4	7.3	1.0	49.1	47.8	5.6	66.2%	72.1%	14.4%	4.9	5.1	1.1
Infectious disease	162.0	170.8	173.5	43.2	0.3	13.1	13.6	12.7	3.2	0.2	12.5	12.4	1.0	36.1%	43.5%	13.3%	10.5	11.8	3.9
Gerontology	77.3	77.3	77.3		0.0	7.5	7.5	7.5		0.0	10.3	10.3		92.8%	92.8%		32.9	32.9	
Average		180.0			0.3	13.6	14.1			0.3									
Weighted average	88.8					8.5													
Median	95.0				0.2	8.8				0.2									
Standard Deviation	183.5			96.8	0.3	16.6				0.3									

5.2.3. Tertiary level hospitals

Figure 7 shows the weighted cost per inpatient admission at the tertiary hospitals. Cost per admission was 196,000 Tugricks at the National Cancer Center, 174,900 Tugricks at the Infectious Disease Research National Center, 152,500 Tugricks at the Trauma and Injury hospital, 106,000 Tugricks at the Clinical Hospital III, 71,600 Tugricks at Clinical Hospital I and 64,500 Tugricks at the Maternal and Children Research Center. As expected the cost of inpatient admissions is significantly higher at the tertiary hospitals as compared with lower level hospitals. This is because they are highly specialized national referral centers that deal with complicated cases and conduct research. The differences in focus of each hospital makes cross hospital comparison difficult and likely inappropriate.

Figure 7: Cost per inpatient admission at tertiary hospitals

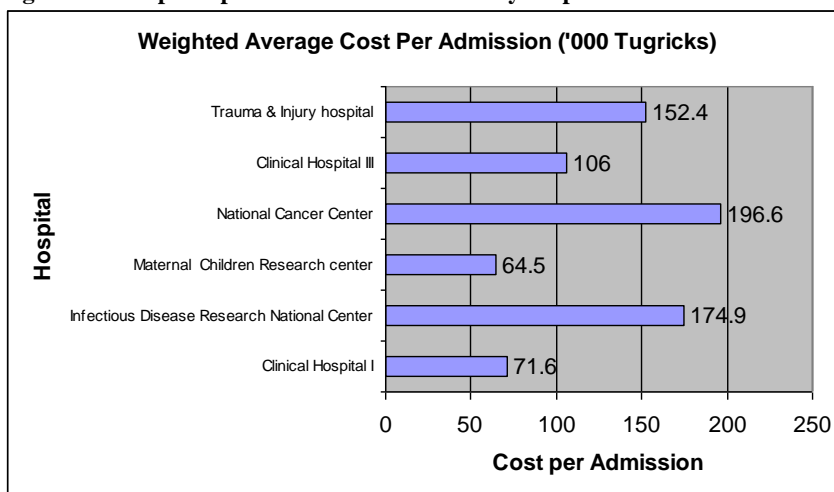


Table 19 shows that all tertiary hospitals had high occupancy and turn over rates. The exception was the National Infectious Disease Research Center that had an occupancy rate of only 54.7% and a turn over rate of 13.7.

Table 19: Inpatient unit costs and Service Indicators ('000 Tugricks)

Tertiary hospitals	Weighted Cost per admission	Cost per bed day	ALOS	Bed occupancy rate	Turnover rate
Maternal and Child Health Research Center	64.5	9.2	7.1	84.3%	45.8
Clinical hospital I	71.6	8.8	8.1	89.6%	32.4
Clinical hospital III	106	11.2	9.5	79.9%	28.8
Trauma and Injury Hospital	152.4	9.6	15,9	106.2%	35.2
National Infectious Disease Research Center	174.9	8.9	19.7	54.7%	13.7

National Cancer Center	196.6	14.9	13.0	99.5%	42.6
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Table 20 gives the cost per outpatient visit. The highest cost is at the National Cancer Center and the lowest at the Trauma and Injury hospital. Once again making cross facility comparisons for tertiary hospitals will not be appropriate given the type of cases they deal with and the unique focus of each facility.

Table 20: Cost per outpatient visit ('000 Tugricks)

Tertiary level hospitals	Cost per outpatient visit
Clinical hospital III	3.4
Clinical hospital I	3.7
Infectious Disease Research National Center	4.6
National Cancer Center	6.2
Trauma and Injury Hospital	0.4
Maternal and Child Health Research Center	2.7
<i>Average</i>	3.5

Appendix 2 provides a detailed breakdown of unit costs and other indicator by department for each of the tertiary hospitals. Some interesting findings emerged during the course of the study. At the Clinical Hospital III occupancy rate at the VIP ward was 124.6% in spite of the fact that user fees are high to use this ward. Clearly there is a willingness to pay out-of-pocket for specialty care. On the other hand the department of neurosurgery appeared to have excess bed capacity in relation to service needs. At Clinical Hospital I there was overcrowding at the Intensive Care Unit which had occupancy rates in excess of a hundred percent. The National Infectious Disease Research Center performed poorly on most indicators. It had a low occupancy and turn over rate. Department such as Air borne infectious disease, pediatric hepatitis, food borne infectious disease, adult hepatitis, emerging and epidemic infectious disease all appear to have excess bed capacity. The National Cancer Center and Maternal Health Research Center appear to be working at near full capacity. The utilization of inpatient services at the Trauma and Injury hospital is higher than other tertiary hospitals and because of the severity of cases treated patients tend to stay longer at the limb injury, pediatric injury, adult injury, burn unit and relapse units.

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7. Summary of Key Findings

This study represents the first time a systematic assessment was undertaken of the cost of inpatient care using a sample of hospitals from the primary, secondary and tertiary levels. A number of key findings emerged from the study that we believe have important implications for how services are organized and paid for. This is particularly relevant given that Mongolia has decided to transition to performance based budgeting and contracting¹⁷.

Some of the key findings are as under:

18.● Using information to improve facility performance is a concept and capacity that has yet to become part of the culture at the national, regional and facility level. Having said this there is the human capacity in terms of well trained facility managers, accountants, economists and statisticians to make this happen. What is lacking is the training in these new skills supported by changes to how health care is financed and paid for in Mongolia.

19.● While not an explicit focus of this study we found that quality has yet to become integral to the service delivery system. In this regard we would point to some recent thinking on how patients' experiences should be the fundamental basis for defining quality¹⁸. We believe that it is important to build in tracking some key quality indicators into the information systems and to use this information for improving facility performance.

20.● A number of important lessons emerged during the data collection exercise. These included among others:

- The current format in which information is kept at the facility level is less than optimal to analyze and monitor the cost of services
- Information was not always available at the desired level of detail. As example, data gaps existed in accounting costs by cost centers, registration of utilization of support services like laboratory tests and radiology exams by cost centers.
- Because of how the hospital information systems are organized cost data are not always available from routine data systems. There is an emphasis on tracking expenditures by line items as this is the format required by the Ministries of Health and Finance. There is far less emphasis on creating data needed to improve the performance of a health facility

¹⁷ See guidelines 1 and 2 prepared under this TA Project

¹⁸ The Institute of Medicine, a body of the U.S. National Academy of Sciences, has published a report called "Crossing the Quality Chasm." This provides a systems approach to quality. This report has been followed by a number of research papers including "A Users' Manual for the IOM's Quality Chasm Report," Donald M. Berwick, Health Affairs, Volume 21, Number 2

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- We also observed that there was a lot of variance in the availability of information across similar facilities

21.● The pattern that emerges from the study is that the share of inpatient services to total costs increases with the level of the facility with at least half of all costs being spent on inpatient services at every level of facility. While this is true overall there were some Soum hospitals that spent more as a percentage of total costs on inpatient care as compared with some Aimag hospitals. We observed much less variability in percentage of total costs going to outpatient care across levels of facilities. Outreach services are provided mostly at the primary level and hence the share of this component is higher as a percentage of total costs at the primary level as compared with secondary level hospitals. Given that catchments area tend to much larger at the primary level share of ambulance services to total costs is also higher.

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22.● The cost per admission was 45,500 Tugricks at the Soum Hospital, 62,400 Tugricks at the Intersoum Hospital, 58,000 Tugricks at the Rural General Hospital, 88,800 at the Aimag and District General Hospital, 69,300 Tugricks at the RDTC and 103,000 at the Tertiary Hospital. One observes a fair amount of variance in the cost per admission across hospitals in the same category and across hospitals across different categories. An interesting observation was that the weighted average cost per admission was higher at the Intersoum hospitals as compared with Rural General Hospitals even though the latter provide more complex care. The maximum cost per admission for Intersoum Hospitals was for infectious disease, for Aimag hospitals this was for TB related admission at one of the hospitals, for tertiary level hospitals this was related to admission to an ICU.

23.● Costs per bed day range from 5,200 Tugricks at the Soum Hospital to 9,900 Tugricks at the Tertiary Hospital. Intersoum hospitals had on average, higher cost per bed day as compared with Rural General Hospitals. The average cost per bed day was lower at RDTC as compared with Aimag hospitals. As with the cost per admission we observed a fair amount of variance in the cost per bed day across similar facilities and across facilities at different levels.

24.● The cost per outpatient visit was 1,000 Tugricks at the level of Soum Hospitals, 1,200 Tugricks at Intersoum hospitals, 1,500 Tugricks at the Rural Hospital, Aimag and RDTC and 2,800 Tugricks at the Tertiary Hospital. While one observes lower variance in the weighted average cost per outpatient visit across levels of facilities there is a significant amount of variance in unit costs within the same level of facility and by type of service within and across facilities.

25.● Cost per ambulance call is highest at Soum and Intersoum hospitals. This is not surprising given the remoteness of Soum and Intersoum hospitals and the distance between these facilities and distances that needs to be covered to reach their target population.

26.● The FTE doctor per bed is highest at Aimag/district hospitals, followed by Intersoum hospitals, tertiary hospitals, Rural General Hospital, Soum

hospitals and RDTC. What is surprising is that FTE doctors per bed ranges from .05 to .20 at the Soum Hospitals a four fold difference, from 0.13 to .23 at the Intersoum hospitals, from .15 to .27 at the Aimag hospitals and from .07 to .23 at the Tertiary Hospitals. The number of FTE nurses per bed is the highest at the level of the Soum hospitals, followed by Tertiary level hospitals, Aimag and General Hospitals, RDTC, Rural General Hospital and Intersoum hospitals. An interesting finding is that while in all hospitals the number of nurses per bed was greater than the number of doctors per bed the figure was very similar at the level of the Intersoum hospitals. The variance in staffing per bed and the fact that Aimag hospitals appear to have more FTE doctors and nurses per bed as compared with even tertiary hospitals probably indicated the need to take a closer look at staffing patterns at hospitals.

27. On average doctors saw 12,329 outpatient visits at the level of the Soum Hospital, 10,069 at the level of Intersoum hospitals, 2351 at the Rural General Hospital, 4927 at Aimag and district general hospitals, 4948 at RDTC and 4403 at the Tertiary Hospitals. Clearly the number of outpatient visits per doctor is significantly higher at the Soum and Intersoum levels. The average number of inpatient admissions per doctor was 1039 at Soum hospitals, 253 at Intersoum hospitals, 221 at Rural General Hospitals, 267 at Aimag and District Hospitals, 311 at RDTC and 197 at Tertiary hospitals. Once again Umnuldegar Soum hospital was the outlier with a reported 3085 inpatient admissions per doctor. However, it is important to keep in mind that there are outliers in both categories and these might have skewed findings. We did go back to the hospitals that were outliers to verify their figures. Based on discussion we decided against changing the numbers for this round of analysis. However it is clear that there is a need for greater standardization and validation of data that is reported from facility level.

28. The findings with regards ALOS confirms earlier data that Mongolian hospitals have fairly long lengths of stay. The ALOS for Soum hospitals was 8.7, with a minimum of 7.8 days and a maximum of 10.1 days. For Intersoum hospitals the ALOS was 9.7 days with a minimum of 8.7 days and a maximum of 11.7, for Rural General hospital the ALOS was 9.8 days, for Aimag and District Hospitals the mean ALOS was 12.8 days with a minimum of 10.1 days and a maximum of 11.7 days, for RDTC the ALOS was 14.6 days and for Tertiary hospitals the mean ALOS was 13.1 days with a minimum of 7.8 days and a maximum of 19.5 days. The data shows that, on average, ALOS is higher at the secondary and tertiary level facilities as compared with primary level facilities. This is consistent with the fact that secondary and tertiary level hospitals tend to treat sicker patients and more complicated cases.

29. In terms of occupancy rates this was 65.1% for Soum hospitals, 47.7% for Intersoum hospitals, 82.2% for the Rural General hospital, 67.6% for Aimag and District hospitals, 82.1% for RDTC and 85.7% for Tertiary hospitals. Thus, occupancy rates are much lower at the Soum, Intersoum and Regional General Hospital as compared with occupancy rates at the Aimag, RDTC and Tertiary hospitals. However, if one were to analyze the variations in occupancy rates we find that for Soum hospitals in the sample occupancy rates ranged from a low of 34.6% to a high of 99.8%. For Intersoum hospitals

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the minimum occupancy rate was 40% and the maximum 58.5%, for Aimag and District General hospitals the minimum occupancy rate was 46.9% and the maximum 95.3% and for tertiary hospitals the minimum occupancy rate was 54.7% and the maximum 106.2%. While some hospitals are working at close to or in excess of full capacity it is clear that there is a large amount of unused bed capacity at hospitals especially at the Soum, Intersoum and Aimag levels¹⁹.

- 30.● The bed turn over rate was 27.3 for Soum hospitals, 19.5 for Intersoum hospitals, 33.1 for the Rural General Hospital, 23.1 for Aimag and District hospitals, 26.8 for RDTC and 33.1 for Tertiary hospitals. Turnover rate at the tertiary level is highest which means than on average these facilities are performing well with relatively small proportion of unused beds. Regional diagnostic and treatment center shows low turn over rate and high occupancy rate, which is probably related to the fact of unnecessary long inpatient days.
- 31.● An analysis of the relationship between average length of stay and the weighted average cost per admission showed that there is a strong positive relationship between average length of stay and the cost per admission.
- 32.● To the extent that higher costs are incurred in earlier days of hospital admission, we would expect average cost per bed day to be negatively related to ALOS. However we observe that this is not the case for the hospitals in our study. In Mongolia there appears to be a positive relationship between average length of stay and the cost per bed day.
- 33.● One might hypothesize that a higher occupancy rate would be associated with lower costs per inpatient bed day and per admission. This is because fixed costs such as staff salaries and depreciated value of capital assets would be spread over a larger number of admissions. However, we observe a weak but positive relationship between occupancy rate and the weighted cost per admission in the case of the hospitals in our sample.
- 34.● One thing this study did not verify was whether the care provided was necessary or conformed to protocols or quality standards. However, during the course of the study research team members did examine a few patient records and there was anecdotal evidence that the treatment was either not necessary, could be done in a different setting (outpatient versus inpatient), or that protocols were not followed.

While there was anecdotal evidence about inefficiencies within the Mongolian hospital system this study attempts to quantify some key cost and efficiency indicators. The picture that emerges is one where there is room to improve the performance, and probably the need, to improve the public hospital sector in the country. There is excess bed capacity mainly at the primary and secondary levels, staff productivity can be improved, inpatient lengths of stay tend to be long, and resource allocation is not tied to either population needs or performance of the

¹⁹ At the tertiary and RDTC level occupancy rates are comparable to similar facilities in other developing countries. This is based on an analysis of hospital costing studies.

facility. Large variations exist in the cost and efficiency indicators across facilities at different levels, between facilities within the same level, and across departments within a particular facility. Tertiary hospitals appear to perform better on key efficiency indicators as compared with lower level hospitals. Some hospitals in our sample reported occupancy rates in excess of a hundred percent.

8. Recommendation

The structure of health systems tends to reflect historical factors, cultural values, past and current policies, and expectations of the population. During the socialist times Mongolia had a command and control economy that emphasized central planning, standardization and an emphasis on building health systems around large hospitals. Subsequently, as a first step to changing how health care was financed the country introduced social insurance and the SSIGO implemented a single flat rate payment to providers. This was most likely the correct first step to take. However, it is likely that this encourages keeping average costs high and emphasizing inpatient care at the expense of outpatient services. The research team also felt that the Mongolian population is accustomed to hospitalization and long stays at hospitals are associated with good quality care. This in turn results in longer than necessary lengths of stay and unnecessary hospitalizations.

We are aware that the Mongolian government and the Ministry of Health are moving to change and reform the health sector. Mongolia is transitioning from a centrally planned, managed and financed health care system to one that emphasized autonomy, population based planning, assuring access to the population to an Essential Package of Health Services, improving information and accounting systems, and performance based budgeting and reimbursements²⁰.

Based on the key findings from this study the team would like to make a few recommendations that we believe can improve the efficiency of the public hospital sector in Mongolia.

- We strongly believe that in order to better manage facilities, reduce costs and improve efficiency there is a need to significantly improve and strengthen cost accounting and data capture systems at the facility level. Investments will be needed to improve both availability and reliability of the required data. We hope the initiative to develop health management information systems will take into account some of the findings from this study even as it seeks to address such issue
- There is a need to introduce quality and efficiency indicators at the level of the facility. These indicators in turn should be linked to the output-based budgeting approach developed by the ADB TA project.
- Given that the average unit costs have built into them the inefficiencies observed at hospital levels reimbursing facilities using average costs might

²⁰ See Output based budgeting Guides 1 and 2 produced under this TA

encourage more inefficient behavior at the facility level. Hence the value of this study is in helping to inform the discussion on how to reimburse facilities by quantifying costs and providing a comparison of costs and efficiency indicators across facilities.

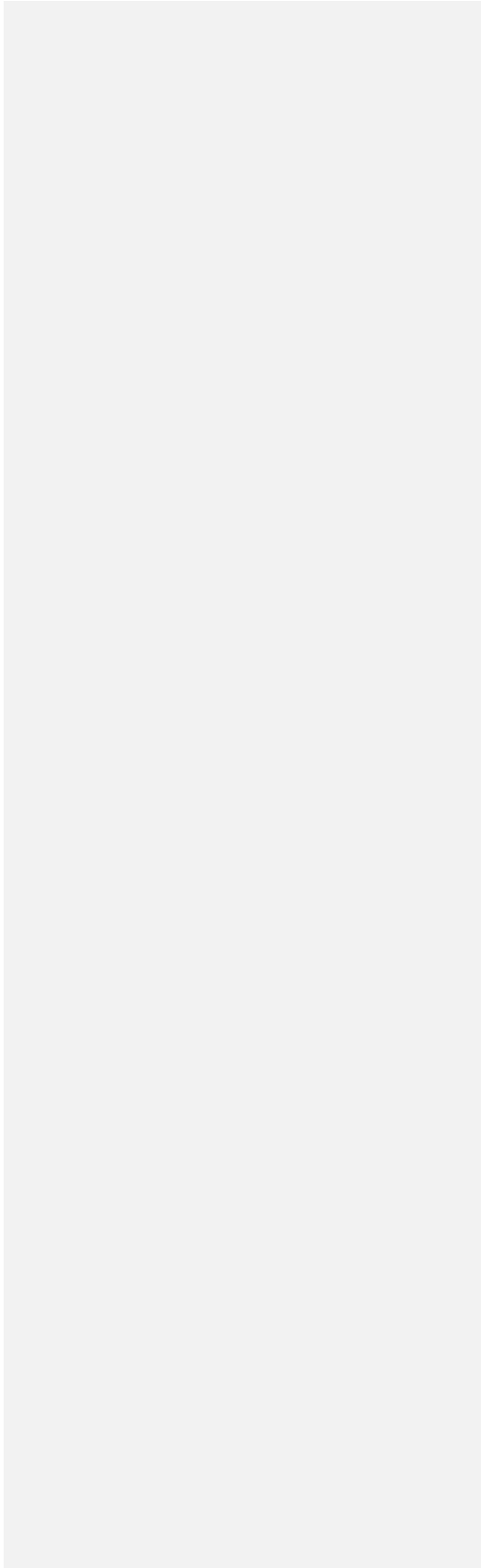
- There is a need to invest in human capacity building. This will involve the training of hospital managers on how to use cost data to improve efficiency and better manage resources (human, financial and other) to produce quality health care that is responsive to patient needs.
- Link this study to the findings from the Costing of the Mongolian Essential Health Care Package²¹. The MEHCP costing study uses an input-output based approach to costing and develops some estimates of providing care that follow protocols. Comparing the ideal against the actual can be useful and informative.
- The Ministry of Health should consider introducing policies that encourage greater autonomy, provision of financial and non-financial incentives to service providers that encourage efficiency, strengthen outpatient and outreach services
- There is also a need to increase public awareness about good quality care, the importance of prevention and public health interventions and health life styles. Changes to the service delivery system will not be possible unless the consumer is willing to buy-into the notion that these changes are for their benefit.
- Last but not least there is a need to institutionalize the Hospital Costing efforts

a-d. In order to increase the capacity at central and local levels and make progress to the implementation of the PSFML, pilot and introduce the Hospital output/service costing Guideline proposed by the TA project.

b-e. The study team does not recommend any single software that the Ministry of Health should adapt. A set of excel programs have been developed that will permit facilities to replicate the outputs produced for this study. Similarly, there is costing software that has been made available to the TA project by an international consultant assisting with the TA project. There is off-the-shelf software that is commercially available. We recommend that the Ministry of Health appoint a committee that can systematically evaluate and test the various alternatives and then make a decision of which to use.

e-f. While the software chosen is not important we would like to re-emphasize the importance of introducing a standardized approach to capturing relevant costs at the facility level. It is equally important to integrate concepts of costing into routine functions at all levels, train staff in the costing techniques, integrate key indicators into routine data capture systems, regular collection, analysis, validation and feedback of facility performance.

²¹ Conducted under the ADB TA Project



Appendix 1: Inpatient unit costs by specialty departments and by Aimag/district hospitals

(Thousand Tugricks)

Cost centers	Dundgovi Aimag general hospital					
	Cost admission	per day	Cost per bed	ALOS	Bed occupancy rate	Turn-over rate
Internal medicine	86.8	7.0		12.4	53.4%	15.8
Pediatrics	82.8	9.0		9.2	50.6%	20.2
Surgery (general surgery, traumatology, ophthalmology, ENT, maxillo-facial surgeries)	72.8	11.0		6.6	52.2%	28.7
Obstetrics						
Gynecology						
Obstetrics and gynecology	77.8	9.8		7.9	65.6%	30.2
Intensive care unit	788.9	52.8		14.9	12.6%	3.1
Neurology and psychiatric disease	85.6	6.0		14.3	41.5%	10.6
Traditional medicine						
Dermatology	42.6	4.3		10.0	60.0%	22.0
TB	935.2	19.6		47.8	49.8%	3.8
Infectious disease	173.5	12.7		13.6	44.1%	11.8
Others / Elderly/						
Average	260.7	14.7		15.2	47.7%	16.2
Weighted average	91.8	9.5				
Median	85.6	9.8		12.4	50.6%	15.8
Standard Deviation	344.7	15.0		12.6	15.1%	9.9
Cost centers	Khentii Aimag general hospital					
	Cost admission	per day	Cost per bed	ALOS	Bed occupancy rate	Turn-over rate
Internal medicine	60.3	4.6		13.0	88.0%	24.7
Pediatrics	60.0	6.8		8.9	91.8%	37.8
Surgery (general surgery, traumatology, ophthalmology, ENT, maxillo-facial surgeries)	61.6	6.8		9.1	77.2%	31.1
Obstetrics	78.4	11.4		6.9	88.3%	46.9
Gynecology	114.2	7.9		11.3	94.3%	30.4
Obstetrics and gynecology						
Intensive care unit						
Neurology and psychiatric disease	69.7	6.1		11.5	83.7%	26.6
Traditional medicine						
Dermatology						
TB						

Infectious disease						
Others / Elderly/						
Average	74.0	7.3	10.1	87.2%	32.9	
Weighted average	0.0	6.8				
Median	65.7	6.8	10.2	88.1%	30.7	
Standard Deviation	21.0	2.3	2.2	6.1%	8.2	
Cost centers	Selenge Aimag general hospital					
	Cost admission	per day	Cost per bed	ALOS	Bed occupancy	Turn-over rate
Internal medicine	89.5	8.3	10.8	79.9%	27.1	
Pediatrics	77.6	8.6	9.0	82.7%	33.4	
Surgery (general surgery, traumatology, ophthalmology, ENT, maxillo-facial surgeries)	101.2	14.3	7.1	72.0%	37.0	
Obstetrics	113.8	13.2	8.6	97.2%	41.1	
Gynecology	94.3	10.0	9.4	63.5%	24.6	
Obstetrics and gynecology						
Intensive care unit						
Neurology and psychiatrics disease	98.2	8.7	11.3	57.8%	18.6	
Traditional medicine	66.2	6.4	10.3	36.6%	13.0	
Dermatology	192.6	19.3	10.0	19.6%	7.2	
TB	299.5	5.4	55.2	76.7%	5.1	
Infectious disease	212.6	17.1	12.4	20.8%	6.1	
Others / Elderly/						
Average	134.5	11.1	14.4	60.7%	21.3	
Weighted average	106.7	9.7				
Median	99.7	9.3	10.1	67.8%	21.6	
Standard Deviation	75.3	4.6	14.4	26.8%	13.3	
Cost centers	Zavkhan Aimag general hospital					
	Cost admission	per day	Cost per bed	ALOS	Bed occupancy	Turn-over rate
Internal medicine	73.9	7.0	10.6	62.6%	21.6	
Pediatrics	70.1	7.6	9.2	41.4%	16.4	
Surgery (general surgery, traumatology, ophthalmology, ENT, maxillo-facial surgeries)	91.9	8.3	11.1	64.8%	21.2	
Obstetrics						
Gynecology						
Obstetrics and gynecology	90.3	11.0	8.2	55.4%	24.6	
Intensive care unit	669.6	80.3	8.3	23.1%	10.1	
Neurology and psychiatrics disease	85.3	8.0	10.7	47.0%	16.0	
Traditional medicine						
Dermatology	188.1	16.1	11.7	12.2%	3.8	
TB	414.0	9.4	44.2	72.1%	6.0	

Infectious disease	126.3	10.9	11.6	43.5%	13.7
Others / Elderly/					
Average	201.1	17.6	14.0	46.9%	14.8
Weighted average	109.2	10.6			
Median	91.9	9.4	10.7	47.0%	16.0
Standard Deviation	206.6	23.7	11.4	19.6%	7.2
Cost centers	Songinohairkhan District general hospital				
	Cost admission	per Cost per bed day	ALOS	Bed occupancy rate	Turn-over rate
Internal medicine	69.8	6.6	10.6	100.9%	34.7
Pediatrics					
Surgery (general surgery, traumatology, ophthalmology, ENT, maxillo-facial surgeries)					
Obstetrics					
Gynecology					
Obstetrics and gynecology					
Intensive care unit					
Neurology and psychiatrics disease	116.3	10.8	10.7	92.3%	31.4
Traditional medicine					
Dermatology					
TB					
Infectious disease					
Others / Elderly/	77.3	7.5	10.3	92.8%	32.9
Average	87.8	8.3	10.5	95.3%	33.0
Weighted average	80.2	7.6			
Median	77.3	7.5	10.6	92.8%	32.9
Standard Deviation	24.9	2.2	0.2	4.8%	1.6

Appendix 2: Inpatient unit costs by specialty departments and by category of tertiary hospitals

(Thousand Tugricks)

Clinical hospital III

Cost center	Cost per admission/surgery	Cost per bed day	ALOS	Bed Occupancy rate	Turnover rate
ICU	702.3	100.7	7.0	68.4%	35.8
VIP ward	218.0	15.9	13.7	124.6%	33.1
Nephrology & Endocrinology	90.3	8.2	11.0	74.9%	24.8
Cardiology	97.7	8.4	11.7	76.6%	24.0
Pulmonology	105.2	8.4	12.5	92.4%	26.9
Hepatology	102.4	9.1	11.3	93.5%	30.3
General Surgery	106.4	13.7	7.7	77.1%	36.3
ENT	67.6	10.2	6.6	74.1%	40.8
Cardiac Surgery	133.8	10.4	12.8	74.5%	21.2
Neurosurgery	186.9	15.7	11.9	56.8%	17.5
Neurology	94.8	8.3	11.4	92.7%	29.8
Ophthalmology	81.1	11.4	7.1	65.3%	33.7
Traditional Medicine	93.2	7.7	12.1	67.8%	20.5
General Operation Theatres	64.8				
Average	153.2	17.6	10.5	79.9%	28.8
Weighted average	106.0	11.2			
Median	102.4	10.2	11.4	74.9%	29.8
Standard Deviation	168.4	25.1	2.5	17.4%	7.0

Clinical hospital I

Cost center	Cost admission/per surgery	Cost per bed day	ALOS	Bed Occupancy rate	Turnover rate
Digestive system	78.6	7.2	11.0	88.2%	29.4
Nephrology	93.3	6.9	13.5	96.7%	26.2
Kidney Dialysis	110.6				
Endocrinology & hematology	88.2	8.2	10.8	92.6%	31.3
Cardiology	88.5	7.2	12.3	97.8%	29.0
Pulmonology	77.4	6.4	12.1	95.6%	28.9
Neurology	71.9	6.8	10.6	98.9%	33.9
ENT	68.6	9.0	7.6	66.7%	31.9
Ophthalmology	46.0	5.9	7.8	80.2%	37.7
Colon-rectal surgery	72.1	7.0	10.2	74.5%	26.5
Maxillofacial surgery	83.5	9.0	9.3	89.9%	35.4
Urology	94.1	8.2	11.5	84.0%	26.6
General Surgery	74.7	9.1	8.2	83.2%	37.1

General Operation Theatres	16.6				
Traditional Medicine	76.4	7.9	9.7	103.6%	38.9
ICU	704.0	69.8	10.1	133.0%	48.1
Vip ward	240.9	27.4	8.8	59.0%	24.5
Average	122.7	13.1	10.2	89.6%	32.4
Weighted average	71.6	8.8			
Median	78.6	7.9	10.2	89.9%	31.3
Standard Deviation	156.4	16.5	1.7	17.3%	6.3

National Infectious Disease Research Center

Cost center	Cost per admission	Cost per bed day	ALOS	Bed Occupancy rate	Turnover rate
ICU	383.6	145.0	2.6	13.6%	18.8
Air borne	181.6	13.5	13.4	25.2%	6.8
Brucellosis Zoonosis	149.1	7.1	21.1	70.9%	12.3
Pediatric Hepatitis	130.3	14.7	8.9	24.3%	10.0
Food Borne	83.2	16.9	4.9	32.0%	23.8
Adult hepatitis	173.3	7.2	24.1	53.3%	8.1
Emerging and epidemic infectious disease	200.4	14.1	14.2	12.9%	3.3
Chronic hepatitis	67.6	8.7	7.8	74.0%	34.7
Adult TB	356.5	4.8	73.8	122.2%	6.0
Child TB	147.9	6.0	24.7	71.4%	10.5
TB surgery	213.1	9.2	23.2	101.5%	16.0
Average	189.7	22.5	19.9	54.7%	13.7
Weighted average	174.9	8.9			
Median	173.3	9.2	14.2	53.3%	10.5
Standard Deviation	99.8	40.8	19.6	36.6%	9.2

National Cancer Center / Full /

Cost center	Cost per admission	Cost per bed day	ALOS	Bed Occupancy rate	Turnover rate
ICU	504.0	153.6	3.3	92.8%	103.3
Chemotherapy	121.2	18.4	6.6	121.5%	67.4
Radiology	265.5	11.5	23.0	95.2%	15.1
Surgery	165.7	10.8	15.4	102.3%	24.3
Female cancer	145.0	10.1	14.4	94.3%	23.9
Head and Neck cancer	155.3	10.1	15.4	91.2%	21.6
Average	226.1	35.8	13.0	99.5%	42.6
Weighted average	196.6	14.9			
Median	160.5	11.2	14.9	94.7%	24.1

Standard Deviation	144.9	57.8	7.1	11.4%	35.1
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Trauma and Injury Hospital

Cost center	Cost admission/surgery	Cost per bed day	ALOS	Bed Occupancy rate	Turnover rate
Limb Injury	148.4	7.4	20.1	98.1%	17.8
Pediatrics Injury	112.4	6.4	17.5	103.8%	21.7
Adult Injury	153.5	6.4	24.1	151.9%	23.0
Cranial Cerebral	92.0	8.8	10.5	111.1%	38.7
Thoraco-abdominal	118.1	11.5	10.3	138.6%	49.4
ICU	204.0	57.8	3.5	105.8%	109.5
Burn Unit	222.4	11.1	20.0	72.9%	13.3
Relapse unit	253.6	8.2	30.8	67.2%	8.0
General Operation Theatres	214.5				
Average	168.7	14.7	17.1	106.2%	35.2
Weighted average	152.4	9.6			
Median	153.5	8.5	18.7	104.8%	22.4
Standard Deviation	56.7	17.5	8.7	29.0%	32.9

Maternal and Child Health Research Center

Cost center	Cost per admission	Cost per bed day	ALOS	Bed Occupancy rate	Turnover rate
General Surgery					
Obstetrics					
Maternity 1	48.8	12.3	4.0	90.1%	82.7
Maternity 2	41.4	7.3	5.7	94.3%	60.7
Extra genital disorders	49.5	5.3	9.4	94.4%	36.7
Premature delivery	100.2	15.9	6.3	66.1%	38.2
Mature newborn	15.5	4.4	3.5	89.9%	92.5
Premature newborn	78.4	13.1	6.0	58.5%	35.7
Intensive care	178.0	39.8	4.5	86.7%	70.9
Gynecology					
Gynecology surgery	65.7	8.6	7.6	80.1%	38.4
Gynecology inflammatory disorders	97.3	9.7	10.0	82.1%	30.0
Pediatrics					
Pediatrics surgery					
General surgery	58.4	6.9	8.5	100.1%	43.2
Kidney and abdominal surgery	82.1	9.1	9.0	104.1%	42.1
ENT surgery	53.7	7.9	6.8	79.5%	42.6
Eye surgery	67.8	9.8	6.9	70.6%	37.1
Maxillo-facial surgery	81.5	10.0	8.1	88.3%	39.7
Intensive care surgery	390.2	130.5	3.0	56.8%	69.4

Internal medicine					
Respiratory infections	47.9	6.7	7.1	114.3%	58.7
Gastroenterology	63.3	8.0	8.0	85.3%	39.2
Cardiology & Hematology	105.6	8.4	12.6	86.0%	24.9
Kidney and endocrinology	111.3	6.3	17.7	75.8%	15.6
Neurology	70.0	5.6	12.4	109.7%	32.2
Neonatal	113.5	11.2	10.2	96.5%	34.6
Emergency	331.7	53.3	6.2	35.8%	21.0
Intensive care	185.5	35.8	5.2	93.9%	66.2
Average	106.0	18.3	7.8	84.3%	45.8
Weighted average	64.5	9.2			
Median	78.4	9.1	7.1	86.7%	39.2
Standard Deviation	90.1	27.4	3.3	18.0%	19.7

Appendix 3: Data collection forms

Hospital Costing Form: Assets 2003

Facility Name: Dundgovi Aimag general hospital

Person filling Form:

(1000 Tugricks)

Category of Cost Center	Buildings			Machinery and Equipment		Vehicles		Furniture		Total Asset Depreciation
	Area	Re-evaluation value	Depreciated Amount 2003	Re-evaluation value	Depreciated Amount 2003	Re-evaluation value	Depreciated Amount 2003	Re-evaluation value	Depreciated Amount 2003	
Overhead cost centers										
Finance and Administration										
Household and supplies										
Garage										
Engineering and maintenance:										
<i>Medical equipment maintenance</i>										
<i>Building, utilities maintenance</i>										
Cleaning and service (security, cleaning, waste disposal)										
Laundry										
Others										
Support service cost centers										
Sterilization										
Kitchen										
Rehabilitation										

Laboratory:											
<i>Clinical</i>											
<i>Biochemical</i>											
<i>Immunology</i>											
<i>Cytology and cytology</i>											
<i>Bacteriology</i>											
Diagnostic imaging:											
<i>X-ray</i>											
<i>USI</i>											
<i>Endoscopy</i>											
<i>ECC</i>											
<i>EEG</i>											
Morgue											
Blood bank											
Medical records unit											
Pharmacy											
Other											
Direct Service Cost centers											
Inpatient:											
Internal medicine											
Pediatrics											
Surgery (general surgery, traumatology, ophthalmology, ENT, maxillo-facial surgeries)											
Obstetrics											
Gynecology											

Obstetrics and gynecology											
Intensive care unit											
Neurology and psychiatrics disease											
Traditional medicine											
Dermatology											
TB											
Infectious disease											
Others											
Outpatient:											
Internal medicine											
Neurology											
Pediatrics											
Gynecology											
Psychiatrics											
Ophthalmology											
ENT											
Reproductive Health											
General surgery and traumatology											
Traditional medicine											
TB											
Dermatology											
Dentistry											
Oncology											
Infectious diseases											
Others											
Other Direct Service cost centers:											

<i>Outreach services</i>																				
<i>Ambulance service</i>																				
Total amount																				

Hospital Costing Form: Information for Step down allocation

Facility Name: Dundgovi Aimag general hospital

Person filling Form:

	FTE staff	OPD visit/Outreach visits	Inpatient admissions	Number of bed days	Ambulance calls	Laboratory tests					Diagnostic Imaging tests					Sterilized equipments and supplies	Distribution of blood in liters			
						<i>Clinical</i>	<i>Biochemical</i>	<i>Immunology</i>	<i>Cytology and cytology</i>	<i>Bacteriology</i>	<i>X-ray</i>	<i>USI</i>	<i>CT</i>	<i>Endoscopy</i>	<i>ECG</i>			<i>EEG</i>		
Overhead cost centers																				
Finance and Administration																				
Household and supplies																				
Garage																				
Engineering and maintenance:																				
<i>Medical equipment maintenance</i>																				
<i>Building, utilities maintenance</i>																				
Cleaning and service (security, cleaning, waste disposal)																				
Laundry																				

Others																			
Support service cost centers																			
Sterilization																			
Kitchen																			
Rehabilitation																			
Laboratory:																			
<i>Clinical</i>																			
<i>Biochemical</i>																			
<i>Immunology</i>																			
<i>Cytology and cytology</i>																			
<i>Bacteriology</i>																			
Diagnostic imaging:																			
<i>X-ray</i>																			
<i>USI</i>																			
<i>Endoscopy</i>																			
<i>ECG</i>																			
<i>EEG</i>																			
Morgue																			
Blood bank																			
Medical records unit																			
Pharmacy																			
Other																			
Direct Service Cost centers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	#####	670.0	0.0	54.0	0.0	0.0	0.0	0.0
Inpatient:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	#####	670.0	0.0	54.0	0.0	0.0	0.0	0.0
Internal medicine																			
Pediatrics																			

Surgery (general surgery, traumatology, ophthalmology, ENT, maxillo-facial surgeries)																					
Obstetrics																					
Gynecology																					
Obstetrics and gynecology																					
Intensive care unit																					
Neurology and psychiatrics disease																					
Traditional medicine																					
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Ophthalmology																					
ENT																					
Reproductive Health																					
General surgery and traumatology																					
Traditional medicine																					
TB																					
Dermatology																					

Dentistry																		
Oncology																		
Infectious diseases																		
Others																		
Other Direct Service cost centers:																		
<i>Outreach services</i>																		
<i>Ambulance service</i>																		
Total																		

Hospital Costing Form: Drugs and Medical Supplies

Facility Name: Dundgovi Aimag general hospital

Person filling Form:

Category of Cost Center	Drugs and medical supplies (1000 Tugricks)
Overhead cost centers	
Finance and Administration	
Household and supplies	
Garage	
Engineering and maintenance:	
<i>Medical equipment maintenance</i>	
<i>Building, utilities maintenance</i>	
Cleaning and service(security, cleaning, waste disposal)	
Laundry	
Others	
Support service cost centers	
Sterilization	
Kitchen	
Rehabilitation	
Laboratory:	
<i>Clinical</i>	
<i>Biochemical</i>	
<i>Immunology</i>	
<i>Cytology and cytology</i>	
<i>Bacteriology</i>	
Diagnostic imaging:	
<i>X-ray</i>	
<i>USI</i>	
<i>Endoscopy</i>	
<i>ECG</i>	
<i>EEG</i>	
Morgue	
Blood bank	
Medical records unit	
Pharmacy	
Other	
Direct Service Cost centers	
Inpatient:	
Internal medicine	
Pediatrics	

Surgery (general surgery, traumatology, ophthalmology, ENT, maxillo-facial surgeries)	
Obstetrics	
Gynecology	
Obstetrics and gynecology	
Intensive care unit	
Neurology and psychiatrics disease	
Traditional medicine	
Dermatology	
TB	
Infectious disease	
Others	
Outpatient:	
Internal medicine	
Neurology	
Pediatrics	
Gynecology	
Psychiatrics	
Ophthalmology	
ENT	
Reproductive Health	
General surgery and traumatology	
Traditional medicine	
TB	
Dermatology	
Dentistry	
Oncology	
Infectious diseases	
Others	
Other Direct Service cost centers:	
Outreach services	
Ambulance service	
Total	

Hospital Costing Form: Personnel Salary Allocation - Fiscal year 2003

Facility Name: Dundgovi Aimag general hospital

Person filling Form:

1000 Tugricks

Cost centers	Base Salary	Additional allowances and increments	and Total	Distributed Amount				Total Personnel
				Inpatient Amount	Outpatient Amount	Ambulance care service Amount	Outreach activities Amount	
Overhead cost centers								
Finance and Administration								
Household and supplies								
Garage								
Engineering and maintenance:								
<i>Medical equipment maintenance</i>								
<i>Building, utilities maintenance</i>								
Cleaning and service (security, cleaning, waste disposal)								
Laundry								
Others								
Support service cost centers								
Sterilization								
Kitchen								
Rehabilitation								
Laboratory:								
<i>Clinical</i>								
<i>Biochemical</i>								
<i>Immunology</i>								
<i>Cytology and cytology</i>								
<i>Bacteriology</i>								
Diagnostic imaging:								
<i>X-ray</i>								
<i>USI</i>								
<i>Endoscopy</i>								
<i>ECG</i>								
<i>EEG</i>								
Morgue								
Blood bank								
Medical records unit								
Pharmacy								
Other								
Direct Service Cost centers								
Inpatient:								

Internal medicine								
Pediatrics								
Surgery (general surgery, traumatology, ophthalmology, ENT, maxillo-facial surgeries)								
Obstetrics								
Gynecology								
Obstetrics and gynecology								
Intensive care unit								
Neurology and psychiatrics disease								
Traditional medicine								
Dermatology								
TB								
Infectious disease								
Others								
Outpatient:								
Internal medicine								
Neurology								
Pediatrics								
Gynecology								
Psychiatrics								
Ophthalmology								
ENT								
Reproductive Health								
General surgery and traumatology								
Traditional medicine								
TB								
Dermatology								
Dentistry								
Oncology								
Infectious diseases								
Others								
Other Direct Service cost centers:								
Outreach services								
Ambulance service								
Total								

Hospital Costing Form: Revenue and Expenses**Facility Name: Dundgovi Aimag general hospital****Person filling Form:**

Line items	Amounts (1000 Tugricks)
Total expenditure	
Base salary	
Additional allowances and increments	
Social insurance contribution paid by employer	
Stationery	
Electricity	
Heating	
Water and sewage	
Transport and fuel	
Communications and postal	
Domestic travel	
Books and subscriptions	
Training and seminars	
Research and development	
Purchase of household inventories and materials for facility	
Uniforms and linen	
Drugs and medical supplies	
Food	
Recurrent Maintenance	
Payments, fees and insurance	
One time benefit and remuneration	
Tuition fee for civil servants' children	
Other recurrent expenditures	
Sources	
State budget	
Health Insurance fund	
User fee and others	

Appendix 4: List of the Research team

1. Aimag health facilities

Selenge Aimag (1)

D. Bayasgalan, Bayasgalan, Financial management specialist ADB project

Nyamaa, Chief accountant of Health Department, Selenge Aimag

Tsogtsetseg Chief Accountant of Selenge Aimag hospital

B. Enkhjargal, Lecturer, Health Economics unit, University of Health and Medical Sciences

Dundgobi Aimag (2)

Ch. Davaasuren, Accounting consultant ADB project

Ch. Tsetsegbadam, Chief accountant of the Dundgobi Aimag hospital

Ch. Byambaa, Economist of Health Department, Dundgobi Aimag

Monkhtuul, Financial evaluation and monitoring Officer, MoH

Ovorkhangai Aimag (3)

Ts.Tsolmongerel HSR TA consultant

Tserendolgor, Chief accountant of the Ovorkhangai Regional diagnostic and Treatment Center

Khentii Aimag (4)

B. Monkhtsetseg, Health economics officer, MOH

S. Kherlenchimeg, Chief Accountant of Khentii Aimag hospital

G. Khongorzul, Health economist Aimag health department

B. Monkhand, Officer, Economics and Technology Department, DMS

Zavkhan Aimag (5)

1. Sh. Sabit, Officer, Economics and Technology Department, DMS

2. B. Amarzaya, , Economist of Health Department Zavkhan Aimag

3. D. Chimeddolgor, General accountant Zavkhan Aimag hospital

4. Javkhlanbayar, Lecturer, Health Economics unit, University of Health and Medical Sciences

2. Ulaanbaatar health facilities

Songinohairkhan district hospital (6)

Sh. Sabit, Officer, Economics and Technology Department, DMS

Gerelt-od, Deputy Director, Songino Khairkhan district hospital

G. Ariunsaikhan, Economist, Songino Khairkhan district hospital

1st Clinical hospital (7)

O. Purevkhoo, Chief accountant, First Clinical Hospital

B. Monkhtsetseg, Financial evaluation and monitoring Officer, MOH

3. Javkhanbayar, Lecturer, Health Economics unit, University of Health and Medical Sciences

3rd Clinical hospital (8)

Chantsalnyam, Chief accountant, 3rd Clinical hospital

Ts. Tsolmongerel, HSTA project, health care finance consultant

3. G. Purevsuren, Health insurance doctor, 3rd Clinical hospital

National Infectious Disease Research Center (9)

Ts. Enkhbayar, Deputy Director, National Infectious Disease Research Center

2. O. Purevkhoo, Chief accountant, First Clinical Hospital

Monkhtuul, Financial evaluation and monitoring Officer, MOH

National Cancer Center (10)

S. Narantuya, Chief accountant of the National Cancer Center

B. Monkhand, Officer, Economics and Technology Department, DMS

3. B. Enkhjargal, Lecturer, Health Economics unit, University of Health and Medical Sciences

Maternal and Child health Research Center (11)

Javzandulam, Chief accountant, Maternal and Child Health research center,

2. S. Ganchimeg, General statistician, Maternal and Child Health research center

Ts. Tsolmongerel, HSTA project, health care finance consultant

National Traumatology hospital (12)

S. Byambanaidan, General accountant National Traumatology Center

Sh. Sabit, Officer, Economics and Technology Department, DMS

G. Ariunsaikhan, Economist, Songino Khairkhan district hospital

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