# COST ANALYSIS OF MIRWAIS AND NANGARHAR REGIONAL HOSPITALS IN AFGHANISTAN

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for the Degree of Master of Science Program in Health Economics and Health Care Management

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# การวิเคราะห์ต้นทุนของโรงพยาบาลศูนย์มิรไวส์และนันการ์ฮาร์ ในประเทศอัฟกานิสถาน

นายมูฮัมหมัด ยูนูส

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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| Field of Study | Health Economics and Health Care Management |
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มูฮัมหมัด ยูนูส : การวิเคราะห์ต้นทุนของโรงพยาบาลศูนย์มิรไวส์และนันการ์ฮาร์ในประเทศอัฟกานิสถาน (COST ANALYSIS OF MIRWAIS AND NANGARHAR REGIONAL HOSPITALS IN AFGHANISTAN) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: อ.ดร.นพพล วิทย์วรพงศ์, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: นพ.พิรัส ประดิษฐวณิช, 81หน้า.

การศึกษานี้เป็นการวิเคราะห์ต้นทุนรวมและต้นทุนต่อหน่วยของการให้บริการผู้ป่วยในและผู้ป่วยนอกของโรงพยาบาลศูนย์มิรไวส์และโรงพยาบาลนันการ์ฮาร์ สำหรับ 1390 (21 มีนาคม 2554 ถึง 20 มีนาคม 2555) ซึ่งต้นทุนของทั้งสองโรงพยาบาลถูกแบ่งหน่วยต้นทุนหลักออกเป็น 3 ส่วน ทั่วไป สนับสนุน และแผนกคลินิก หลักการ Step-down ถูกนำมาใช้สำหรับการจัดสรรต้นทุนของหน่วยทั่วไปและหน่วยสนับสนุนไปยังแผนกคลินิก

ต้นทุนรวมของแต่ละโรงพยาบาลถูกประมาณการและหลังจากนั้นต้นทุนต่อหน่วยของผู้ป่วยในและผู้ป่วยนอกในแต่ละโรงพยาบาลก็ถูกประมาณการตามมา การศึกษาแสดงให้เห็นว่าถึงแม้ว่าโรงพยาบาลมิรไวส์จะมีจำนวนเตียง และอัตราการครองเตียงต่ำกว่าโรงพยาบาลนันการ์ฮาร์ แต่กลับมีต้นทุนรวมและต้นทุนต่อหน่วยสูงกว่า

การศึกษาแสดงให้เห็นว่า 90% ของต้นทุนรวมในโรงพยาบาลมิรไวส์และ 86% ของโรงพยาบาลนันการ์ฮาร์เป็นต้นทุนของผู้ป่วยใน ส่วนที่เหลืออีก 10% และ 14% เป็นต้นทุนผู้ป่วยนอก ตามลำดับ ต้นทุนการครองเตียงต่อวันของแผนกสูติ-นรีเวชสูงที่สุดในโรงพยาบาลทั้งสองแห่ง สำหรับผู้ป่วยนอก(OPD) ต้นทุนต่อการมาตรวจสูงที่สุดในโรงพยาบาลมิรไวส์ คือ แผนกผู้ป่วยวัณโรค ขณะที่โรงพยาบาลนันการ์ฮาร์ คือ แผนกศัลยกรรมทั่วไป ค่าใช้จ่ายที่มีผลกระทบสูงต่อผู้ป่วยในคือแผนกสูติ-นรีเวช ในทั้งสองโรงพยาบาล และแผนกผู้ป่วยนอกวัณโรคในโรงพยาบาลมิรไวส์

ต้นทุนค่ายาและเภสัชกรรมเป็นต้นทุนส่วนใหญ่ของต้นทุนรวม ในโรงพยาบาลมิรไวส์และโรงพยาบาลนันการ์ฮาร์ พบ 46% และ 50% ตามลำดับ จากการสังเกตระบบสุขภาพของประเทศอย่างไม่เป็นทางการส่วนใหญ่ใช้ยานอกประเทศ โรงพยาบาลสามารถลดต้นทุนโดยเพิ่มการใช้ยาภายในประเทศและโรงพยาบาลยังสามารถขยายการใช้งานของอุปกรณ์ทางการแพทย์ได้อีกด้วยเช่นกัน

สาขาวิชา เศรษฐศาสตร์สาธารณสุขและการจัดการบริการสุขภาพ ลายมือชื่อนิสิต .....

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# 5485655929: MAJOR HEALTH ECONOMICS AND HEALTH CARE MANAGEMENT
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MOHAMMAD YONUS: COST ANALYSIS OF MIRWAIS AND NANGARHAR REGIONAL HOSPITALS IN AFGHANISTAN. ADVISOR: NOPPHOLWITVORAPONG, Ph.D. CO–ADVISOR: PIRUS PRADITHAVANIJ, M.D., FACHE., 81 pp.

This study analyzes total costs and unit costs of inpatient and outpatient services of Mirwais and Nangarhar Regional Hospitals for 1390 (March 21, 2011 to March 20, 2012). Both hospitals were divided into three main cost centers: general, ancillary and clinical departments. The step-down approach was used for allocating costs of general and ancillary departments to clinical departments.

The total cost of each hospital was estimated and then the unit costs for inpatient and outpatient departments in each hospital were found. The study shows that although the Mirwais hospital had a lower number of beds and a lower utilization rate than Nangarhar hospital, but it had higher total costs, and in general higher unit costs.

The study shows that 90% of the total cost of Mirwais hospital and 86% of Nangarhar hospital were IPD costs. The remaining 10% and 14% respectively were OPD costs. The cost per bed day in OB/GYN department in both hospitals was the highest. The cost per visit (OPD) in Tuberculosis OPD department is the highest in Mirwais hospital while it was General Surgery OPD department for Nangarhar hospital. The capital expenditures had higher effect on OB/GYN IPD in both hospitals and Tuberculosis OPD department of Mirwais hospital.

In both Mirwais and Nangarhar hospitals drug and pharmacy costs accounted for the greatest part of the total costs: 46% and 50% of costs respectively. Based on casual observation of the health system of the country, foreign drugs are mostly used. The hospitals can reduce the unit costs of services by increasing using domestic drugs. The hospital also can extend usage of the equipment.

Field of Study: Health Economics and Health Care Management . Student's Signature .....

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Co-advisor's Signature .....

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| | |
|---|---|
| ALOS | Average Length of Stay |
| BOR | Bed Occupancy Rate |
| BPHS | Basic Package of Health Services |
| CSO | Central Statistics Organization |
| DC | Direct Cost |
| ENT | Ear, Nose and Throat |
| EPHS | Essential Package of Hospital Services |
| FC | Fixed Cost |
| GDP | Gross Domestic Product |
| HMIS | Health Management Information System |
| HRP | Hospital Reform Project |
| IC | Indirect Cost |
| IPD | Inpatient Department |
| MC | Marginal Cost |
| MoF | Ministry of Finance |
| MoPH | Ministry of Public Health |
| NGO | Non-Governmental Organization |
| NRPCCs | Non-revenue Producing Cost Centers |
| OB/GYN | Obstetrics and Gynecology |
| OPD | Outpatient Department |
| RPCCs | Revenue Producing Cost Centers |
| TC | Total Cost |
| VC | Variable Cost |

# CHAPTER I

# INTRODUCTION

## 1. 1 Problem and Significance

As a post conflict country, Afghanistan is facing many challenges in provision and delivery of health care. In 2002, after more than two decades of war, the government's main concern was delivery of primary health care to its people. At that time, it was difficult to concentrate on delivery of secondary and tertiary health care, because the capacity of government was low and government's priority was to rebuild the health system and provide the basic health care service to people. Ministry of Public Health of Afghanistan (MoPH) established two packages of health services: basic package of health services (BPHS) and essential package of hospital services (EPHS) to rebuild the health system and respond needs of people. BPHS was introduced in 2003 and EPHS was introduced in 2005.

BPHS is consisted of district hospital (DH), comprehensive health center (CHC), basic health center (BHC), and health posts (HP) that deliver primary healthcare services to people in districts and villages level. There are two delivery mechanisms for BPHS, contracting-out to NGOs and contracting in. Out of 34 provinces, three provinces are contracted in with the provincial health departments to deliver the BPHS to people and other remaining provinces are contracted out to NGOs.

EPHS was established in 2005 to provide secondary and tertiary healthcare to provincial and regional level. EPHS is consisted of provincial hospitals and regional hospitals. There are 5 regional hospitals in the country and 29 provincial hospitals.

The classification of hospital has been done according to size of the population, number of beds, workload, and complexity of services offered by hospital. There are four levels of hospitals operating in the country: district hospitals, provincial hospital, regional hospitals and national hospitals. National hospitals are specialty and teaching hospitals located in Kabul working as referral hospitals for provincial and regional hospitals and as education and training hospitals (MoPH, 2006).

Regional hospitals play an important role in health sector in Afghanistan. Regional hospitals are referral hospitals that provide professional inpatient and emergency services that are not available in district and provincial hospitals. Regional Hospitals also provides inpatient and outpatient services for patients who directly visit the regional hospitals. Regional hospitals act as a training center for health professionals and collecting HMIS data and medical research information, but they are not teaching hospitals (MoPH, 2006).

As far as the provision of basics health services was institutionalized, the government has focused on the provision of secondary and tertiary health care as well. During last years, hospitals in provinces have received huge assistance from international donors. The government works to mobilize internal resources and decreases the dependency of hospitals to donors as part of national health policy. At the same time, hospitals are facing huge challenges in authority and decision making on spending of the budget receiving from government due to centralized organizational structure of ministry of health. The new hospital policy emphasizes on autonomy of hospitals and suggests that full and legal autonomy of hospitals is essential under hospital reform project (MoPH, 2011). While hospitals become autonomous to decide on budgeting and allocation of resources it is difficult for

managers of hospital to make decision on making budget and allocation of resources without having information on total cost and unit costs of hospital outputs. There is lack of information on pervious expenditure and no hospital cost information exists because no costing study has been done on hospital service level (MoPH, 2011). Cost analysis of hospital can help managers in hospital level to make proper decision on resource allocation, financial management and improving efficiency of the hospital. The analysis can also be used by provincial and central level managers in decision-making and comparison of hospitals in provincial and regional level.

Another concern of the government is a decrease in foreign donations and limited internal resources. Government needs to maintain past funding level and efficiency of health service delivery. Hospitals are main parts of the health delivery system of the country and account for 26% of total health expenditure of health care in Afghanistan (MoPH, 2009). Large proportion of highly trained doctors and other health professionals are working in hospitals. Information on costs of hospital can help hospital managers to think about revenue generation and decreasing the gap between available resources and required resources through efficiently using of available resources. It can also help managers and policy makers in introducing user fee that is part of MoPH policy, because now the all public hospitals and public health facilities provide health care free of charge (MoPH, 2011).

The study can be used by the management of a hospital to assess the efficiency of hospitals and observe the difference in utilization of personnel and material resources among different departments of hospital. MoPH hospital management can use it to see the cost and efficiency differences between Mirwais and Nangarhar regional hospitals and make proper policy decisions with regard to the allocation of

resources and efficiency within regional hospitals. Both Mirwais and Nangarhar regional hospitals are two big regional hospitals in the country with respectively 350 beds and 428 beds and they function as referral hospitals for eastern and southern provinces of the country. The study will be useful for hospital management and regional and provincial health policy makers to use the analysis for improvement of efficiency and management of hospitals.

## 1.2 Research Question

Are there total costs and the unit costs for inpatient and outpatient services different between Mirwais and Nangarhar Regional Hospitals?

## 1.3 Research Objective

*General Objective*

To analyze the unit costs for inpatient and outpatient services of Mirwais and Nangarhar Regional Hospitals in year 1390 (March 21, 2011 to March 20, 2012)

*Specific Objective*

To analyze total cost of services in Mirwais and Nangarhar Regional Hospitals to see the effects of combinations of inputs in total costs of each hospital

To analyze the unit costs of inpatient services and outpatient services in Mirwais and Nangarhar Regional Hospitals and compare the unit cost of same services between these two hospitals in order to see the impact of resource allocation on overall efficiency in the two regional hospitals.

## 1.4 Hypothesis

Under the management of MoPH, the Mirwais Regional Hospital might incur lower total and unit costs than Nangarhar Regional Hospital, which is under the management of an NGO. This is because the MoPH conducts bulk purchasing of

drugs and medical equipment while NGOs typically do so on a smaller scale and the NGO's management cost seems to be higher.

## 1.5 Scope of the Study

This study analyzes and compares the total costs and unit costs of inpatient and outpatient services of Mirwais and Nangarhar regional hospitals from the hospitals' perspectives. Secondary data for the year 1390 (March 21, 2011-March 20, 2012) are used for the study.

## 1.6 Possible Benefit

This study will analyze the unit costs and total costs of Mirwais and Nangarhar Regional Hospitals. The analysis will provide information on resource consumption by different departments that can help managers in charge of each department and each hospital to make proper plan on budgeting and resource-allocating plan in order to improve accountability. Costing analysis will help management of hospital to assess efficiency of hospital and observe the differences in utilization of personnel and material resources among different units of hospital. The study will also be useful tool for decision makers to use for the analysis of hospital management and planning purposes at the regional and national level.

# CHAPTER II

# BACKGROUND

## 2.1 Geo-Demography of Afghanistan

Afghanistan is located between Central and South Asia. Afghanistan shares a common culture and history with Central Asian countries, although now it is classified as being part of the South Asia. It is bordered by Turkmenistan, Uzbekistan, and Tajikistan to the north and Pakistan to the south and east, Iran to the west and China to the northeast (Axyonova, 2013).

Afghanistan is located on the Silk Road as a bridge between Central Asia, China, India and Persia. As a crossroad between different regions, Central Asia becomes the land for development of different civilizations from ancient Turkic and Persian civilizations to Buddhism civilization and from Ancient Central Asian civilization to middle age civilization of Central Asia (Barfield, 2010). Afghanistan was a part of the Central Asia region and Persia until eighteen century and it was created as a new country in eighteen century and later on became today's Afghanistan. Since its establishment as a new country in eighteen century, the country has been witnessed foreign invasions, internal conflicts, despotism and struggle for modernization until the 1980s that was invaded by Soviet Union and then by Islamic extremists in 1990s. During the last two-decades of invasions and civil war, the country's infrastructures including health infrastructures were destroyed. From 1996 to 2001, the major parts of the country were under the control of Taliban regime (one of the most fundamentalist regime of the history of the world). After collapse of the Taliban regime in 2001, Afghanistan adopted a democratic constitution.

## 2.2 Economy of Afghanistan

Afghanistan is a mountainous country with limited arable land. Around 76% of its population is living in rural areas (CSO, 2012). The economy of Afghanistan is highly dependent to foreign aid. Since 2002, the country economy is growing faster, but still the per capita income is low.

GDP per capita in 2011 was 1000 USD. The GDP has grown steadily since 2002 at the rate of 7%. Despite the growth, the unemployment rate is 35% and around 36% of the population is living under the poverty line (CSO, 2012).

## 2.3 Health Indictors of Afghanistan

Afghanistan's Ministry of Public Health mission is to improve health and nutritional status of the citizens of Afghanistan in an equitable manner through quality health service provision (MoPH, 2011). Since the establishment of BPHS in 2002 and EPHS in 2005, the coverage and access to health care has improved significantly. The two packages provide primary and secondary health care services in all provinces. The tertiary health care services are provided by national hospitals mainly located in Kabul. Despite the progress has been made in the last decade, health indicators shows that still there are many problems to be addressed. The following table shows some important health indicators of Afghanistan.

**Table 1: Health Indicators of Afghanistan**

| Indicators | Value | Year | Source |
|---|---|---|---|
| Population Million | 26.5 | 2011 | CSO |
| Life Expectancy at birth | 64 | 2010 | AMS |
| Total Fertility Rate (%) | 5.1 | 2010 | AMS |
| Infant Mortality Rate (per 1,000) live births) | 74 | 2010 | AMS |

| | | | |
|---|---|---|---|
| Under - Mortality Rate (per 1,000 live births) | 102 | 2010 | AMS |
| Maternal Mortality Ratio (per 100,000 births) | 327 | 2010 | AMS |

Sources: CSO and MoPH (AMS)

## 2.4 Hospital System in Afghanistan

Afghanistan Hospital System is composed of four levels of district, provincial, regional and national hospitals. The hospitals are classified according to the size of referral population, workload and the complex of health care services delivered. The hospital services are delivered through two following mechanisms (MoPH, 2006):

1. Contracting out mechanism: district hospitals, 21 out of 29 provincial hospitals and one out of 5 regional hospitals are contracted out with NGOs. These hospitals have partial autonomy.

2. Hospital Reforms Project (HRP): Seven provincial hospitals and three regional hospitals are under the hospital reform project. These hospitals have partial autonomy and HRP has delegated some responsibilities.

National hospitals and Mirwais Regional Hospitals are not part of these two mechanisms. National hospitals have no autonomy. MoPH directly manage them and they have no authority on hiring, firing, procurement and financial issues.

**District Hospitals:**

District hospital covers population of 100,000 – 300,000 peoples. District hospital is staffed with doctors, including female obstetricians/gynecologists, a surgeon, and anesthetist, and pediatrician, midwifes, lab and x-ray technicians, a pharmacist and a dentist with a dental technician. Cases referred to district hospitals include major surgery under general anesthesia, X-rays, emergency obstetrics care and male and female sterilizations. It also provides outpatient and inpatient care for mental patients

and disabled patients. The hospital also provides a wide range of essential drugs and laboratory services (MoPH, 2005).

**Provincial Hospitals:**

Provincial hospital is the referral hospital for provincial level of health system. It is a referral point for patients referred from district hospitals. Provincial hospital provides same clinical services and possibly a few additional specialties that are not provided by district hospitals. Provincial hospitals can refer patients to regional hospitals or national hospitals. Provincial hospitals deliver professional inpatient and emergency services to rural population and provincial capitals. There are 29 provincial hospitals located in the capital city of provinces around the country (MoPH, 2006).

**Regional Hospitals:**

Regional hospital is a referral hospital with specialties for diagnosing, and treating, or referring back to lower-level of hospital. Regional hospital provides inpatient and outpatient services at a higher level than is available at district or provincial hospitals. There are five regional hospitals located in five big cities (MoPH, 2006). Currently regional hospital's service delivery is done through three mechanisms. Three out of five regional hospitals are part of hospital reform project that are managed by MoPH. The reform project has delegated some level of authority and responsibility to the three regional hospitals under the reform project. Nangarhar Regional Hospital is one of the regional hospitals contracted out and managed by an NGO. Mirwais regional hospital is one of the hospitals managed by MoPH and is not reformed and neither contracted out.

**National Hospitals:**

National Hospitals are tertiary hospitals located in Kabul city. These hospitals are directly under the management of MoPH and have no authority over procurement, staffing and financing (MoPH, 2006).

**South Region and Mirwais Regional Hospital**

Mirwais Regional Hospital has 350 beds and is located in Kandahar city in southern Afghanistan. The southern region mainly includes Kandahar, Hilmand, Zabul and Urozgan provinces. The population living in these provinces is around 2,587,600 (CSO, 2012). The zone is not limited to the mentioned provinces and people from southwestern province of Nimroz and from southern provinces of Ghazni and Paktika may be referred to Mirwais regional hospital. Mirwais hospital was established as a provincial hospital in 1975 and it was changed to a regional hospital in 2006.

Mirwais Regional Hospital is located in Kandahar City. Kandahar city is the political and economic center of south region of the country. It is a major transit way for business between Pakistan and Central Asian countries. Kandahar and south region is the original homeland of the Taliban. Taliban has influence in rural areas of the south. The casualties are higher in the area because of roadside bomb and other attacks by the Taliban and mistakes by Afghanistan army and international security forces. Economic condition of Southern region is better than other parts of the country, because of agriculture development, trade and big investment in infrastructures (CSO, 2005). The cultivation and trading of opium and other drugs also play an important role in economy of the south region. According to the he United Nations Office on Drugs and Crime (UNODC), the farmers in southern

Afghanistan harvesting about 80 percent of the world supply of opium for production of heroin.

The Pashtun ethnic group makes the majority of the south population and small number of other population of Tajik, Hazara and Baluch ethnic groups are living in the region as well. Despite of the economic development of south region, the people are more conservative than other part of the country and participation of women in education, health and other social activities is lower than northern region.

**East Region and Nangarhar Regional Hospital**

Nangarhar regional hospital has 428 beds and is located in Jalalabad city in eastern Afghanistan. The eastern region mainly includes Nangarhar, Kuner, Nuristan and Laghman provinces. The population of these four provinces was around 2,377,000 in 2011 (CSO, 2012). The Nangarhar hospital is contracted to an NGO. Government pays compensation for the NGO in exchange of hospital services for the eastern region.

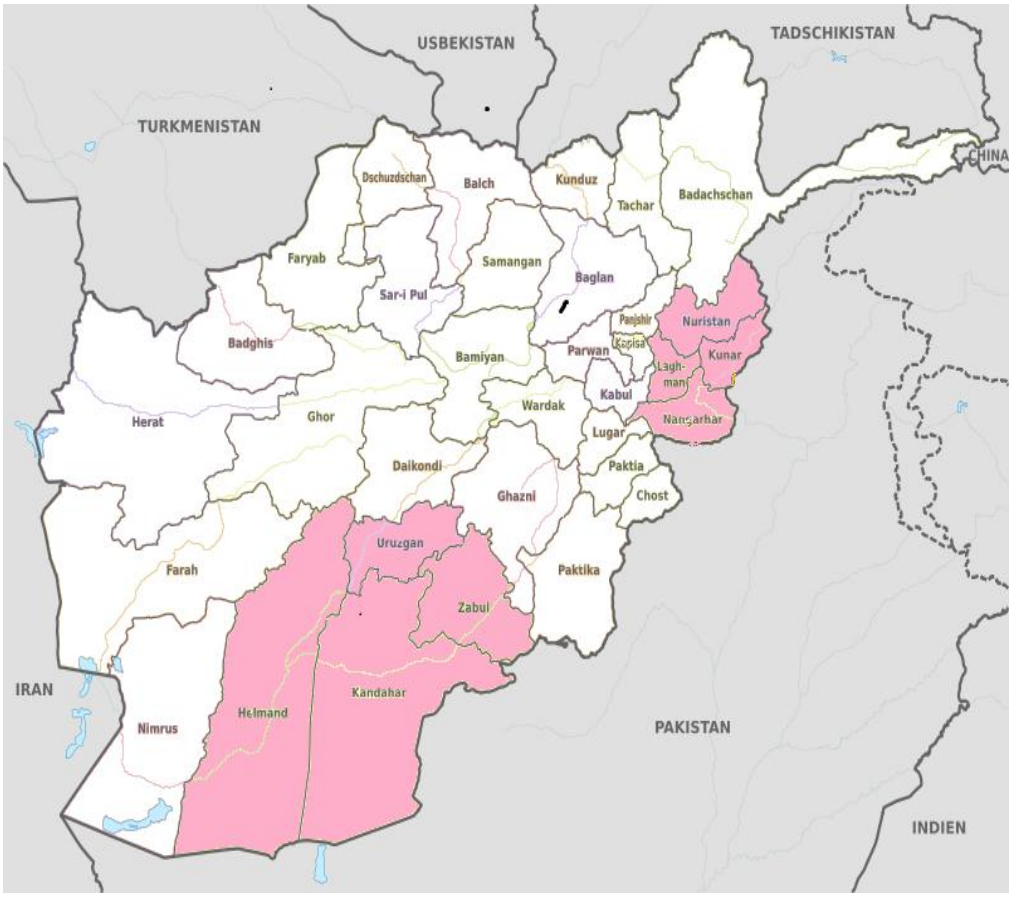
Jalalabad is one of the big cities of the country and the largest city in the eastern region. The economy of people in eastern region depends on agriculture and trade. This region was one of the main areas of opium cultivation and its trade before 2005. Nangarhar is rich in terms of natural resources; it has high quality marbles, forests and water resources (USAID, 2013). Nangarhar has many educational institutions including public and private universities. In addition, there is a well-equipped teaching hospital belongs to medical faculty of Nangarhar University. Jalalabad is relatively a secure city, but there are some security threats in other parts of the eastern region that causes casualties.

The majority of population of Nangarhar, Kuner and Laghman provinces is Pashtuns and there are some populations of Tajiks, Pashai and Arab ethnic groups in this region (USAID, 2013). Nuristan provinces population is mainly Nuristanis, The Nuristani people are an Indo-European-speaking ethnic group native to eastern Afghanistan (Peter R, 2001).

Both hospitals serve the populations of around 5 million people. Both provinces have the similar climate and have borders with Pakistan. Nangarhar regional hospital is part of EPHS and contracted out to an NGO. Mirwais regional hospital is not contracted out and is managed by Provincial Health Department of MoPH. Since 2006, International Red Cross Committee has technically supported Mirwais Regional Hospital.

The following administrative map of Afghanistan shows the location of Mirwais regional hospital in southern Kandahar province and location of Nangahar Regional Hospital in eastern Nangarhar province with the provinces under the coverage of these two hospitals that are highlighted.

**Figure 1: Afghanistan Administrative Map**




Source: (AIMS, 2013)

Currently it is difficult to find information about both expenditure and output of these the hospitals in the previous years, although hospitals have statistics and HMIS have been collecting data on expenditure and utilization. Therefore, this study will focus on the year 1390 where information is available only.

Both hospitals have the same organization structure. The hospital organizational structure is divided into three main sections that are the administrative department, the ancillary or diagnostic department and the medical department. Both hospitals provide similar diagnostic and inpatient and outpatient medical care as listed in the following table.

**Table 2: Mirwais and Nangarhar Regional Hospitals' Departments**

| | |
|---|---|
| **Clinical and diagnostic services** | Inpatient services<br>▪ Internal Medicine<br>▪ General Surgery<br>▪ OB/GYN and Maternity<br>▪ Pediatrics<br>▪ Orthopedics (only in Nangarhar Regional Hospital)<br>▪ Pediatrics<br>▪ ENT<br>▪ Eye<br>▪ Infectious Diseases (only in Nangarhar Regional Hospital)<br>Outpatient<br>▪ Internal Medicine<br>▪ General Surgery<br>▪ OB/GYN and Maternity<br>▪ Pediatrics<br>▪ Orthopedics ( only in Nangarhar Regional Hospital)<br>▪ ENT<br>▪ Eye<br>▪ Infectious Diseases (only in Nangarhar Regional Hospital)<br>▪ Mental Health<br>▪ Stomatology<br>▪ Tuberculosis (only in Mirwais Regional Hospital)<br>▪ Skin (only in Mirwais Regional Hospital)<br>Ancillaries (diagnostic services)<br>▪ Pharmacy |

| | |
|---|---|
| | ▪ Laboratory<br>▪ Blood Bank<br>▪ X-ray<br>▪ Ultrasound<br>▪ Endoscopy<br>▪ Anesthesia |
| **Administrative and support services** | General Administration and Management<br>▪ Administration<br>▪ Maintenance<br>▪ Kitchen<br>▪ Laundry<br>▪ Transport |

The administrative division displayed above is taken from the hospitals administration department.

There are few differences between the two hospitals in clinical wards. Mirwais hospital does not have Orthopedics IPD and Infectious Diseases wards, while Nangarhar hospital has these two wards. Mirwais hospital has Tuberculosis OPD and Skin OPD wards, but Nangarhar hospital does not have these two wards.

## 2.5 Contracting Arrangement

There are two mechanism for delivery EPHS in Afghanistan; contracting out to NGOs and Hospital Reform Project. Seven provincial hospitals and three regional hospitals are under the hospital reform project and other provincial hospitals and one regional hospital (Nangarhar Regional Hospital) are contracted out to NGOs. Mirwais Regional Hospital has different condition. Mirwais hospital is under the management of provincial health department and receives technical support from International Red Cross Committee (IRC). The three regional hospitals that are under the reform projects are located in relatively secure regions of northeast, north and west regions.

Mirwais and Nangarhar regional hospitals are located in two relatively insecure regions of south and east of the country. Due to confidentiality of the contracts documents, it was not possible to access to the contracts or get information about the details of contract arrangements. The information provided here is based on the general information available on contracting mechanism in the hospitals and MoPH.

To date, there has been no study done to see the cost, efficiency and quality of these different contracting arrangements for EPHS. There are assumptions that hospital under the management of MoPH and hospital under the hospital reform project may incur lower costs due to bulk purchasing of supplies and equipment and the low cost of management. The hospitals under the contracting out mechanism may incur higher costs due to procurement of limited amount of supplies and equipment and the higher management costs. Based on the contracting out mechanism, Ministry of Public health is purchasing services from NGO and NGO has to do all procurement and hiring of the staff. NGOs are not for profit organizations, so their objective is to operate in financially break-even, but they consider contingency costs. Since some of the NGOs are international NGO operating in the country, they hire foreign consultants and other foreign technical staff. The salaries and other payments to foreign staff are higher than salaries of local staff (MoPH, 2012).

**Contracting-out Mechanism**

Grant and Contract Management Unit (GCMU) of MoPH is managing the contracting process with NGOs. The GCMU contracts each province to an NGO. The contract period is for one year and each year the GCMU renews the contract. The NGO is selected for each province in a competitive bidding process. The GCMU announce the request for proposal and select the NGOs for the provinces based on

their past performance, financial and technical abilities. Both international and domestic NGOs can participate in the bidding and there are both international and National NGOs operating in the country. There are different stakeholders involving in the process of contracting. Ministry of Finance of Afghanistan, related donors organizations and other related departments within the MoPH including Monitoring and Evaluation Department are involved in the contracting Process. Government pay per capita to NGO and NGO has to provide specific health care packages to specific target population and report to MoPH the process of managing the health care delivery. Government is the principle and NGO plays the role of provider agent. NGO has autonomy on hiring the staff, purchasing the supplies and equipment and delivery of healthcare services. The MoPH plays the role of stewardship and oversight. MoPH make the policy and strategy and NGO has to follow the policy of MoPH. The Monitoring and Evaluation Department of MoPH monitors the process and outcome of the health care delivery by the NGOs through direct monitoring and third party arrangement. The MoPH hires a third party institution to monitor and evaluate the health care provision process and impacts of the health care provision by the NGOs (MoPH, 2012).

**Hospital Reform Project**

Hospital Reform Project (HRP) covers seven provincial and three regional hospitals. HRP is following the Afghanistan's Administration Reform and Civil Services Commission policies. MoPH considers it as another provision mechanism along with contracting out to see the outcome and sustainability of different contracting mechanisms. Department of hospital reform in MoPH, manages the project. MoPH established the HRP in 2006 with coordination of Ministry of Finance

and other stakeholders. In this mechanism, MoPH makes the overall policies and oversight the activities and the Provincial Health Departments implement and manage the hospitals. Hospitals have partial autonomy on expenditure management and budgeting and provision of the reports, but central MoPH purchases the big quantities of drugs and other medical supplies and equipment (MoPH, 2006).

**Contract Arrangement of Mirwais and Nangarhar Regional Hospitals:**

**Mirwais Regional Hospital:** Mirwais Regional Hospital is not contracted out and is not under the reform project as well. It is directly managed by Provincial Health Department that is under the Ministry of Public Health of Afghanistan. The hospital management has no authority on hiring and firing of the staff and budgeting and expenditure management of the hospital. The hospital receives technical assistance from International Red Cross Committee (ICRC). ICRC mission is to serve the war victims and provide care to civilian causalities. Besides working in front-line, ICRC has supported Mirwais Regional Hospital since 2006 (MoPH, 2013).

**Nangarhar Regional Hospital:** Nangarhar Regional Hospital is contracted out to the HealthNet-TPO. The duration of contract is for one year and the extend of the contract depends on the results of monitoring and performances of the NGO. The NGO is selected for the contract based on the competitive bidding process designed by GCMU. HealthNet-TPO is a Dutch NGO works in health care in many countries. HealthNet-TPO has been working in Afghanistan since 1993 (HealthNet_TPO, 2013). The NGO manages the hospital and government pay the budget to NGO. As an NGO, it financially operates on break-even, but considers the contingency expenditures. The NGO is responsible for the hiring of staff and purchasing of drugs and other medical and nonmedical supplies and equipment for the hospital. The government oversight

and monitor the output and outcomes of the services provided by the NGO (MoPH, 2013).

# CHAPTER III

# LITERATURE REVIEW

In this chapter, the concept of cost in health care, classification of cost, hospital's total cost, unit cost and cost analysis of hospital in developing countries will be reviewed.

## 2.1 Concept of Cost

Cost is a payment for resources or factors of production. Since resources are scarce and they are productive and have alternative use, so they create cost. When different resources are combined to produce specific goods or services, the alternative usage of those resources should be forgone that is the opportunity cost of the resources. From business perspective cost is usually a monetary payment for provision of resources to produce goods or services (McConnell, 2008).

Hospital is considered to be like a multi-production firm. The cost of hospital is the market value of inputs used to produce services (Wagstaff and Burnam, 1992).

There are many definitions of cost and it seems to be no single definition of cost, but there are different costs for different purposes (Gapenski, 2007). To see these differences, the classification of cost will be explained in the following paragraphs.

## 2.2 Classification of Cost

Cost can be classified from different perspectives. In general we can classify costs into direct costs, indirect costs and intangible costs.

**Direct, Indirect and Intangible Costs**

Direct costs are costs that directly attributed to the patients. Costs of staff that are directly give service to patient, cost of drug directly used by patient are example

of direct costs. Indirect costs are costs that cannot be linked directly to one product or service. An example can be a supervisor who has to oversee the production of different products or delivery of different services (Shepard, Hodgkin, Anthony, 1998).

Intangible costs denote to the consequences of healthcare services that are difficult to measure and give a value like the days of absent from work, the pain and suffering associated with diagnosis and treatment of a disease and productivity loss (Drummond, 2003)

## 2.3 Cost Behavior

Cost behavior, shows how the total amounts for costs respond to change in the volume of activities in an organization. From cost behavior prospective, costs are mainly classified into fixed cost variable cost and mixed cost or semi-variable cost (Caplan, 2012).

**Fixed, Variable and Semi-variable Costs**

Fixed costs are the costs that over a specific period do not vary with change in quantity of output (Hartgraves & Morse, 2009).

Variable costs are those costs that vary directly with changes in output. Example of variable costs in a hospital are costs of medicine, reagent of laboratory, laundry, kitchen, etc. (Hartgraves & Morse, 2009).

Mixed cost or semi-variable costs consist of elements of fixed and variable costs. Example of these kinds of costs can telephone expenses, electricity etc. (Hartgraves & Morse, 2009).

## 2.4 Total Cost

Total costs are the summation of total fixed costs, total variable costs and total semi-variable costs (Webster, 2004).

## 2.5 Average and Marginal Cost Concept

Average cost is also called unit cost and is equal to total cost divided by number of output quantity or it can be simply defined as cost per unit of output (Hartgraves & Morse, 2011).

Marginal cost is the cost of producing one additional unit of output. It is the change in total cost that arises when the quantity produced changes by one unit. For example, the cost of treating one additional patient is marginal cost (Hartgraves & Morse, 2011).

## 2.6 Economic Cost and Accounting Cost

Economic cost is called opportunity cost, which is the value of the best alternative forgone. Accounting cost is costs that mainly associated with the production of products and do not consider opportunity cost (Hartgraves & Morse, 2011).

## 2.7 Hospital Cost

Costs of hospital include all hospital expenditure in a year including depreciation of capital. Hospital costs can be explained from different perspective based on the purpose of the study. Generally, hospital costs are divided into hotel costs and treatment costs. Hotel cost is constant during the length of stay and treatment cost is high at admission but decreases in later days of stays (Drummond, 2003).

Cost of hospital can be divided into recurrent and capital costs: recurrent cost includes salaries, drugs and other supplies, and capital cost is yearly depreciation of buildings, equipment and vehicles. It also can be divided by type of costs like fixed cost and variable costs as explained earlier. Other division of hospital cost is based on cost center: direct costs and indirect costs (Shepard, Hodgkin, Anthony, 1998).

Direct cost center has direct link with production of final products or it is directly attributable to a patient care as final product. It is also called final product center or in hospitals patient care center. Indirect cost center is called overhead cost center as well. It does not have direct link to production of a final unit. It does not provide directly a patient care but it may provide services to other cost centers in the hospital. Example of overhead cost center can be cleaning services, maintenance and extra in hospital (Shepard, Hodgkin, Anthony, 1998).

**Perspective of Cost Analysis**

Perspective or point of view is important in cost analysis and economic evaluation. Analysts look to cost analysis from one or more than one of following provider prospective, payer perspective, patient perspective, health system perspective, and societal perspective. Adopting a specific perspective depends on the objective and method of cost analysis (Drummond, 2005).

**Steps in Hospital Cost Identification**

The following three steps are important for identifying full cost of each input. Once the full cost of each input is identified and determined, than it will be easy to allocate the cost and calculate the final unit cost for each output and analyze the cost (Shepard, Hodgkin, Anthony, 1998).

- Define the final product.

- Define cost centers.
- Identify the full cost for each input.

**Defining Final Product**

Final product is very important in all industry including hospital. In hospital inputs like human resource, medical resources and other nonmedical resources are used to diagnose an illness and then treat the illness. Treatment can be defined as final product of the hospital but treatment seems be broad in cost analysis of hospital. To make it simple and measureable, the treatment can be divided into outpatient treatment and inpatient treatment. The unit of measurement for outpatient is defined as outpatient visit and the unit of measurement for inpatient is defined as inpatient admission and hospitalization days. The product of hospital is not limited in inpatient and outpatient because some of hospitals are teaching or research hospitals (Butler, 1995).

**Defining Cost Center**

Cost center is defined as a unit of organization for which costs are analyzed. This definition tells us that hospital organizational structure can be analyzed as collection of cost centers. Each of these cost centers use combinations of inputs that produce distinct services. From administrative point of view, the cost center may be classified into final cost centers, intermediate cost centers and overhead cost centers. This classification is widely used in calculation of unit costs of hospital and hospital cost analysis (Shepard, Hodgkin, Anthony, 1998).

- Overhead cost center or general cost center include general management, administrative, accounting and financial activities that do not

provide directly patient care services but support the process of service provision.

- Intermediate or supporting cost center are diagnostic and medical supporting activities that indirectly support the provision and delivery of a treatment service to patients. Pharmacy, laboratory, radiology, city scan etc. are example of supporting cost center.

- Final cost center is clinical cost center that includes direct clinical activities to patient or final cost centers are responsible for direct patient care services. Inpatient wards and outpatient units are examples of final or direct cost center (Shepard, Hodgkin, Anthony, 1998).

**Identify Full Cost for each Input**

Identifying the cost for each input needs to categorize the resources used in hospital. Resources are categorized based on their nature like labor, supplies, equipment, building and land. Each of the categorized resource can be subdivided into smaller unit to make it easier to identify cost of each item (Shepard, Hodgkin, Anthony, 1998).

The distinction between resources that are consumed in one year and resource that are not consumed in one yare is important issue in calculating cost of resources. Resources that are consumed in more than one year considered in capital cost and resources that are consumed in one year are considered in recurrent cost. Recurrent costs mainly include cost of labor, pharmaceutical, medical, and nonmedical supplies, utilities and maintenance. Capital costs includes cost of building and medical and nonmedical equipment that are used in a long period of time and the inclusion of capital cost is done through calculation of depreciation of those capital equipment.

Depreciation determines how much of cost of equipment and building should be included in costing of hospital in each year (Mogyorosy and Smith, 2005).

Generally, the cost of inputs is summarized in cost of personnel, cost of drug and medical supplies, cost of nonmedical supplies and cost of capital.

**Capital Cost**

Collecting information about capital items in some hospitals is a challenging task. Some hospitals may have clear records and inventory of machinery and other equipment, but in some hospital, the data may not exist. The analyst need to collect the information from various sources and study the records of the hospital to identify the related information and then decide to calculate the cost of capital. Calculating cost of capital is also a challenging task that needs to be done based on a proper method. There are different methods of depreciation. The straight-line method, sum of the year digit and double declining balance methods are some of the important methods (Lucey, 2005).

**The straight-line method of depreciation**

This is the most commonly used method. This method is straightforward and easy to use. In this method, the asset cost is distributed evenly to lifespan of the asset (Lucey, 2005).

**Sum of the Year Digit (SYD) Depreciation Method**

This is an accelerated depreciation method. It allocates big proportions of assets' depreciation as an expense during the first useful years of asset. It assumes that the value of assets decreases in greater value in the first years and then the value of the asset decreases gradually (Lucey, 2005).

**Double-Declining-Balance (DDB) Depreciation Method**

DDB is also a method of accelerated depreciation that allows greater amounts of depreciation to be expensed in the first years of the life of the asset. Residual value is ignored in this method of depreciation. This method uses the DDB percentage multiplied by the book value (cost – accumulated depreciation) to determine the amount of depreciation expense for each operating period (Lucey, 2005).

## 2.8 Final Cost Center Determination in Hospital

The important step in allocation of overhead cost to final cost center is to identify the cost center. Each department and ward of hospital can be considered as a cost center. There are different classifications of cost centers. The classification of cost centers in an organization depends on activities and functions of the organization. Determining the activities of hospital should be done before determining the cost centers. Activities in hospital can be divided into groups depending on the objective of the hospital. Major activities are inpatient, outpatient clinic, ancillary services and training section. These activities are the cost areas that are defined hospital cost centers (Newbrander and Lewis, 1999).

The mentioned cost areas are the units in a hospital that can produce the final output of the hospital. Inpatient wards and outpatient wards are cost centers that patients receive their final treatment from those units. Ancillary or diagnostic services are supporting cost centers, not final cost centers, but if the study wants to know the cost of each laboratory test or any other diagnosis than it can be identified as a final cost center. Outreach services that provide service directly to patient outside of hospital can be identified as a final cost center. Training section in a hospital provides

education and training directly to trainees as a final cost center (Shepard, Hodgkin, Anthony, 1998).

Other service departments inside hospital provide services to these five cost areas. The cost of those service department are allocated to the final cost centers based some measures that represent the usage of service activity. For example, the maintenance services may be considered by the measurement of areas of departments and the usage of electricity is measured by actual kilowatt-hour (Stinson, 2002).

There are cost centers that directly produce output or provide service to patients and there is another group of cost centers that do not provide directly service to patient but they support those departments that provide services. Based on this explanation the cost centers can be also classified into revenue producing cost centers (RPCCs) and non-revenue producing cost centers (NRPCCs).

**Revenue producing Cost Centers (RPCCs):**

RPPCC are called patient care departments that provide services to patients. The patient care departments are patient rooms, diagnosis and treatment. These departments can generate revenue by charging fee for treatment services and diagnosis services (Stinson 2002).

**Non-revenue Producing Cost Center (NRPCCs)**

The NRPCCs supports the activities of other departments in a hospital and do not directly provide services to patient. Administration, housekeeping and maintenance are example of NRPCCs that provide services to other departments like patient room, diagnosis and other departments (Stinson 2002).

## 2.9 Methods of Cost Allocation

A number of methods can be used to allocate overhead costs and determine the cost of service or program in a hospital. Direct allocation, step-down, step-down allocation with iterations and simultaneous are the main cost allocation methods widely used.

**Direct allocation**

This method allocates support or service department costs directly to final cost centers, without recognition of any flow between support departments. For example, it directly allocates costs of housekeeping and general administration to final cost center like surgery ward, internal medicine outpatient etc. (Stinson, 2002).

**Step-down Allocation**

It is also called sequential allocation method. This method allocates support department costs to other support departments and to operating departments. This method recognizes the support departments that provide benefit to each other and to final service providers (Stinson, 2002).

**Step-down with Iteration**

This method allocates support departments costs to all of other support departments and to the final cost centers. The procedure repeated a number of times to eliminate residual unallocated amount. This method allocates general costs of hospital for a given period to products or health care services. The method follows several steps according to hospital structure to allocate the hospital costs to cost centers and inpatient bed days, outpatient visits and etc. This method is useful and accurate in the cases where marketable equipment and technology like pharmaceuticals, medical equipment and other supplies make big proportion of resources use. Choosing the order of steps is important

issue in step method. An inappropriate selection of order may reduce the accuracy of the step allocation. The method assumes that resources flows are one way and resources do not flow from last step back to other steps (Mogyorosy and Smith, 2005).

**Simultaneous Allocation Method**

This method uses the same data as step down method but it solves a set of simultaneous equations to give the allocations. It is a method of allocating support department costs to other department and considers all interdepartmental services. The step method allocates costs forward and does not allocate backward (Drummond, 2003).

## 2.10 Unit Cost Determination for each Cost Center

When costs area allocated to each cost center, the total cost of each cost center will be determined. Then the unit cost of each product or services can be calculated and determined through the product of each center. Utilization data is necessary to be incorporated in analysis in this stage to find out the unit cost. For calculating the cost of each element receive services, there is a need to measure resource utilization of each element (unit of measurement). The type of service, the context of service delivery, the exiting, could influence the selection of a proper resource measurement of information, and the cost accounting system. Medical records, case reports and accounting and financial records are main source of data for measuring resource utilizations. (Drummond, 2005)

## 2.11 Costing of hospitals in developing countries

Hospitals are important in health care system of developing countries. Hospitals consume around 50 to 80 percent of healthcare resources in developing countries (Flessa, 2004). Resources used in hospital include most of the medical

personnel and highly trained workers. Hospital plays an important role in improving the health status of people. Primary care cannot be successful without support of hospitals. Since resources are limited in developing countries and the cost of hospital care is increasing, costing is important for allocating of scarce resources and improving of efficiency in provision of inpatient and outpatient health care (Flessa, 2004).

To date, there have been no published studies available on costing of hospitals in Afghanistan and its neighboring countries, however many reports and papers on cost analysis of hospital exist in other developing countries. This study is built on the studies done in other developing countries (Flessa, 1998; Flessa, 2004; Mills, 1991; Trisolini 2000; Shpard, 2000; Tsilaajave, 2009).

**The Costs of District Hospitals in Malawi**

Malawi is low-income country located in Sub-Saharan Africa. Its population is 15.4 million. Its GDP per capita is USD 365. The life expectancy at birth is 54 years (WB, 2013).

Mills studied the cost of district hospitals in Malawi. The objective of his study was to develop guidelines to improve the efficiency of hospital and allocation of health care resources. He selected hospitals in Malawi that could represent Malawi's district hospitals in terms of size, staffing, infrastructure and location. The step down method was used in the study. He collected the expenditures of inputs from different sources. The costs of equipment and buildings were annuitized assuming a useful life of 30 years for building infrastructure, 10 years for equipment, and 6 years for vehicles and 10 years for ambulance. The costs of all inputs were summed up

together, then the costs were grouped, and then the costs were allocated to cost centers and stepped-down to clinical departments (Mills, 1991).

The following findings are based on the distribution of costs by input category in Mills' study. The study found that the proportion of salaries account for 27-39% of total recurrent costs. Capital costs account for highest proportion of total costs that is 46-57% of total expenditures and drugs and pharmaceutical supplies account for 37%. In distribution of costs by cost center the study found that pharmacy was costly that account for 25-38% of total recurrent costs. Then he looked to costs among the clinical departments of hospitals. The study found that there are significant differences between hospitals; the unit recurrent costs shows that the cost per bed of one hospital is 75% higher than another one and in terms of cost per inpatient day it was 238% more expensive than other one. He concluded that the difference should be treated by cautious because of the sensitivity of data used. The more expensive hospital's bed occupancy rate was less the cheaper one. The other reason was the length of stay, TB wards had more length of stay while male wards had shorter length of stay that incurred less costs than TB wards. The study also found that the male and female departments were cheaper than maternity and children departments. After the TB department, maternity was most costly department in hospitals. He explained that unit cost can be a measure of efficiency, but it should be treated carefully because there maybe differences in quality between hospitals. The conclusion of the study was summarized under three sections: the efficiency of hospital operations, retributions of resources district-wide, and adopting costing for routine cost analysis (Mills, 1991).

**The Costs of Hospital Services in Tanzania**

Tanzania is a low-income African country. It has a population around 46 million with per capital income of USD 532. Life expectancy at birth is 58 years (WB, 2013). Flessa studied the costs of seven hospitals belonged to Evangelical Lutheran Church in Tanzania (ELCT) that is a major provider of health care in Tanzania. The purpose of the study was to find out how the hospitals can sustain their services provision while the costs were increasing and the ability of people to pay for the services were decreasing. Flessa selected the step-down method of costing in the study. Costs were collected from the hospitals and then costs were allocated to first cost centers and finally to final cost centers. The study found out the average cost per inpatient day and average cost per outpatient day. The costs of hospital services were divided based on the ELCT standard as costs of staff, costs of trainings, costs of vehicles, costs of hospital equipment and costs of building.

He found that there were differences among hospitals because of differences in efficiency and size of hospitals (economies of scale). He found that technical efficiency could be affected by over staffing of the hospital and over using of drugs. Number of infusion installed in hospitals, remoteness of hospital, the prolonging of hospitals' building life were factors that considered for improvement of efficiency of hospitals in the study. The study found that several costs were increasing more slowly than increasing of output; therefore, the average cost was decreasing. The main cause of economies of scale was true in case of general staff working in administration, laundry, guards, cleaners, equipment and building. The study suggests that sustainability and affordability could be reconciled through increasing of technical efficiency, setting of standards, reducing services and risk sharing (Flessa, 1998).

**Costing of Services in Vietnamese Hospitals**

Vietnam is transitioning from a socialist economy to a market economy. Besides the public health sector, private health sector is also booming. The country public health sector needs to be evaluated in terms of efficiency and resource allocation. Vietnam is a developing country with a population of around 88 million people and per capita GDP of USD 3500 (WB, 2013).

Flessa studied costs of five hospitals in Vietnam including one central hospital, two provincial hospitals, and two district hospitals. The hospitals were selected based on the reliability of their accounting system. The objective of the study was to find out the cost of hospitals costs in Vietnam through finding average costs and as well as main cost drivers (Flessa, 2004).

A step-down approach of costing was used in the study. First, he defined the output to calculate the average cost. Number of inpatients, number of inpatient days and number of outpatient visits. Then the cost centers were identified based on the hospital structure. The main cost centers were direct and indirect cost centers. Then costs of each department were calculated and costs of indirect cost centers were allocated to direct cost centers. Finally, the unit costs of final cost centers were calculated (Flessa, 2004).

The study found that the utilizations rate was varied between 64% bed occupancy rates at a district hospital to 133% of bed occupancy rate in a provincial hospital. The study shows that the big proportion of costs go to personnel (between 35-64%), and the second higher proportion of costs goes to drugs (between 15-27%), and other medical materials such as x-ray, lab material, infusion and blood costs are

between 5-19%. The importance of cost items depends on level of hospital whether it is district or provincial or central (Flessa, 2004).

The unit costs show that the OPD cost per visit is higher in central level hospital than provincial hospital and is higher in provincial hospital than district hospital. The cost per patient day is higher in central hospital than provincial hospital and the cost per patient day is higher in provincial hospital than district hospital. The reasons behind the higher costs of central and provincial hospitals can be the occupancy rate, higher cost per services in higher-level hospitals, and the higher quantity of services per patient day. Central and provincial level hospitals' patient might need higher and more procedure than patients visiting district hospitals. The higher level of hospitals may use advanced facilities to treat patients. He concluded that the study cannot ask higher allocation for higher level hospitals, but it can ask for reduction of some of procedure in district level hospitals, because costs of some of the procedures like microbiological tests, x-rays, and operations of type I and II are higher in district hospitals than in provincial hospitals. The low number procedures may bring the concern of quality in district hospitals. He suggests that accounting system of hospitals need to be improved and the cost data should be collected in routine base. Important point is that these cost data should be analyzed professionally (Flessa, 2004).

As we see in the cost studies of these countries, the step-down method was used in all these studies. The all three studies analyzed the total costs and more importantly the cost per unit of output or average costs of the hospital services. The purposes of the analysis of the study were mainly to improve efficiency through

improving data management and accounting system of hospital and allocation of resources.

# CHAPTER IV

# METHODOLOGY

## 4. 1 Research Design

This study is cost analysis from the hospital perspective. The study will use secondary data to analyze total cost and unit cost of inpatient and outpatient services of the hospitals. The period for the study is 1390 (March 21, 2011 to March 20, 2012).

## 4. 2 Conceptual Framework

Step-down method is used as the method of cost allocation. Step-down method allocates overhead costs to middle cost centers and final cost centers using the top-down approach. This method is widely used and is simple than simultaneous method. Direct allocation method is too simple but is not as accurate as step-down method.

The conceptual framework is demonstrated in figure 3.1. As mentioned earlier, both Mirwais and Nangarhar hospitals have the same organizational structure. The hospital is divided into three main departments: general administration, ancillary and medical service departments. In the first step, all resources are allocated to these three departments. In the second step, the costs of general departments are allocated to the ancillary department and the medical department. In the third step, costs of the ancillary department are allocated to the medical department's wards (inpatient and outpatient) or final cost centers. After the allocation of all cost to final cost centers, the unit cost of inpatient and outpatient will be calculated.

The three departments in each hospital provide distinct services using inputs of production. Each department has units that provide services as explained as below.

1.2 Administration departments include the following units:

- Administration
- Maintenance
- Kitchen
- Laundry
- Transport

2.2 Ancillary Departments includes the following units:

- Pharmacy
- Laboratory
- Blood Bank
- X-ray
- Ultrasound
- Endoscopy
- Anesthesia

3.2 Medical Services Department includes the following units

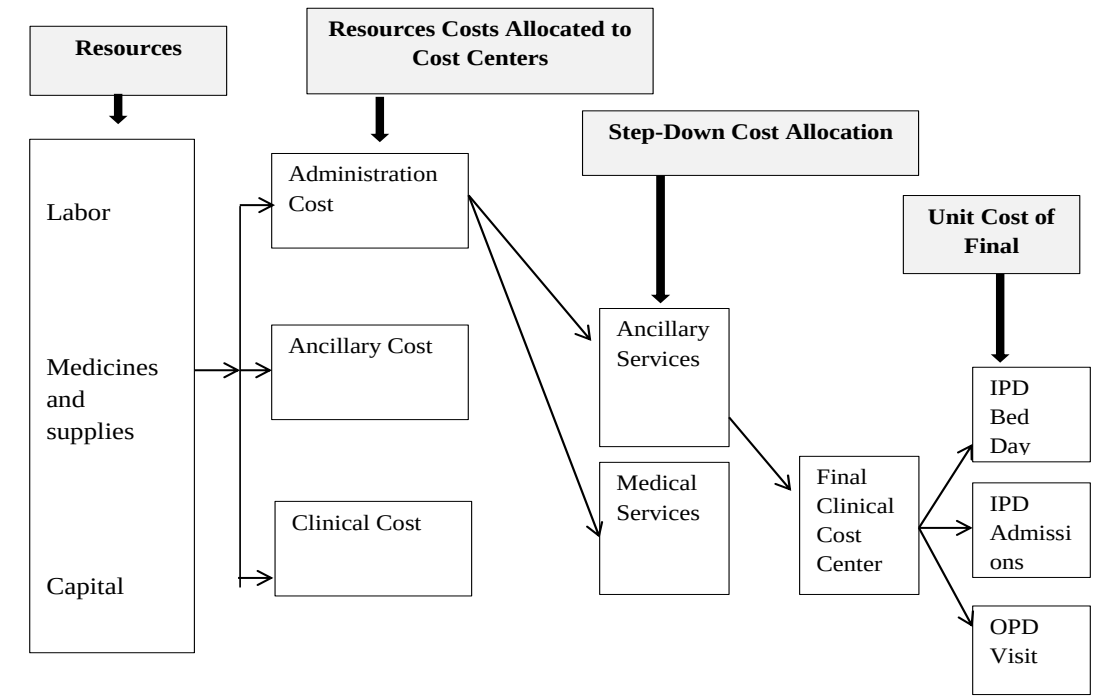
Inpatient services

- Internal Medicine
- General Surgery s
- OB/GYN and Maternity
- Pediatrics
- Orthopedics ( only in Nangarhar hospital)
- ENT
- Eye
- Infectious Diseases (only in Nangarhar hospital

Outpatient includes all mentioned units in inpatient plus Tuberculosis, Mental Health,

Stomatology and Skin. Tuberculosis OPD and Skin OPD exist only in Mirwais hospital.

**Figure 2: Conceptual Framework**




Source: (Tsilaajav, 2009)

## 4.3 Defining Cost Center

The cost centers of each three main departments are listed in table. As shown in the conceptual framework, the cost will be allocated to these cost centers.

**Table 3: Cost Centers**

| General Administration Department | Ancillary Department | Clinical Department | |
|---|---|---|---|
| | | Inpatient | Outpatient |
| Administration | Pharmacy | Internal Medicine | Internal Medicine |

| | | | |
|---|---|---|---|
| Maintenance | Laboratory | General Surgery | General Surgery |
| Kitchen | Blood Bank | OB/GYN and Maternity | OB/GYN and Maternity |
| Laundry | X-ray | Pediatrics | Pediatrics |
| Transport | Ultrasound | Orthopedics ( only in Nangarhar) | Orthopedics (only in Nangarhar |
| | Endoscopy | ENT | ENT |
| | Anesthesia | Eye | Eye |
| | | Infectious Diseases (only in Nangarhar) | Infectious Diseases(only in Nangarhar) |
| | | | Tuberculosis (only in Mirwais) |
| | | | Mental Health |
| | | | Stomatology |
| | | | Skin ( only in Mirwais) |

## 4.4 Data Collection and Source

Secondary data for one year from March 21, 2011 to March 20, 2012 were collected. The hospitals have a record of expenditures and staff and a record of patients. Both Mirwais and Nangarhar data were collected from logbooks and medical records of hospitals:

**General Data and Information of Hospital:** Information on the hospital administrative structure and general administrative departments, ancillary or diagnostic departments and clinical departments and number of beds

**Hospital Utilization Statistics:** Number of outpatient visits, number of inpatient admission, number of inpatient discharges and number of inpatient days by department, and number of hospitalization days by department

**Expenditures:** Data on drug and medical supplies, nonmedical supplies like food, fuel, stationary and other office and cleaning materials were collected from the administration, pharmacy and other related departments, The list of all capital assets including medical and nonmedical equipment were was gathered.

**Human Resources:** A list of staff including their profession, position, function, amount of their monthly salary (including bonus and overtime) and their time allocation to each related department

**Statistics of Ancillary Departments' Services:** Each ancillary department's services for different ancillary and clinical departments were found and were allocated as a percentage to each department. For example, the percentage of the distribution of pharmacy to different ancillary and inpatient and outpatient departments was identified from the drug distribution list.

**Sources of Data**

Sources of data include the procurement unit yearly reports, finance and accounting unit yearly reports, human resources unit, staff payment reports, medical records and statistics unit's annual or quarterly reports of patients.

## 4.5 Data Analysis

The data were imported to a spreadsheet. A spreadsheet was used as a data analysis tool for the study. Data were classified as data related to labor cost, data related to capital and data related to material costs. Then the total cost and unit cost of each output were calculated.

The results were estimated using HOSPICAL. HOSPICAL is an Excel based costing tool designed for top down costing and the calculation of final unit costs.

Management Sciences for Health developed the HOSPICAL for hospital costing in the United States and it was used in costing of National Hospitals in Afghanistan.

**Cost of Human Resource**

The cost of human resources is defined the salary, allowance and other received by hospital personnel. Some of the personnel may work for several units and departments in the hospital. In this situation, their proportion of time spent in each unit will be determined and the cost will be allocated accordingly. Time allocation percent were collected from the head of department and were then allocated to the related departments.

**Calculation of Recurrent Cost**

**Cost of Material**

The costs of materials include costs of medical supplies, office materials and general supplies, maintenance & utilities, and other expenses.

Medical supplies include drugs, low value medical equipment that can be consumed during one year. These medical costs were taken from the procurement and medical store and the distribution list was taken from pharmacy unit. The pharmacy unit keeps the distribution list of pharmacy and the distribution of all medical and nonmedical supplies exists with the general department of the hospital.

**Cost of Utilities**

Costs of electricity, water, fuel consumption costs were allocated to department level and then to each cost center. The Cost of oil was directly allocated to transport.

**Cost of Nonmedical Supplies and other Recurrent Costs**

This category of costs includes the cost of stationary, transportation, communication, other recurrent expense for repairing equipment. These costs were taken from the administration documents and were subsequently allocated to ancillary and clinical departments.

**Capital Cost**

Capital expenditures are costs of acquiring fixed assets. Fixed assets are expensive last more than one financial year or give benefit to the hospital more than one year. Fixed assets make big proportion of inputs in the hospital and any other industry, it is necessary to include costs of expensive tangible assets in the total costs of services (Luucey, 2003). To allocate the fixed assets costs to services, there should be information about the value of fixed assets, the useful life of fixed asset and the acquisition cost or replacement cost of the assets (Shepard, Hodgkin, Anthony, 1998). This allocation of fixed asset costs over the lifetime of an asset is called depreciation.

Capital goods are assets having more than one-year economic life, but they are not available forever. Depreciation is an expense that has to be calculated. To calculate depreciation of an asset we need to have information on the price and useful life of the asset. Sometimes it is difficult to find out the purchasing price or assign the useful life for equipment. In Afghanistan, the Ministry of Finance provides a list of equipment and assets' useful live as well as the depreciation factor, but this list does not include medical and hospital equipment. Based on the MoF tax guidelines the total useful life of building is 50 years. The tax guideline suggests 4 years useful life for furniture and five years for vehicles. The MoF suggest 10 years useful life for those items that their useful life is not included in the tax guideline.

The collection of information on assets was a challenge. I collected a list of medical and nonmedical equipment some only had the name, when the price and purchasing year were missing. Some of the equipment price was not also mentioned. The list did not clearly classify the equipment based on the department or their usage and it was not possible for most of the item to be identified with a certain department.

The buildings of both Mirwais and Nangarhar hospitals dated back to 1970s and both have been used more than 30 years. The initial construction costs of the buildings were not available. The estimate space for hospitals and their proportion usage by different departments was not clear. Another challenge for calculation of depreciation cost of buildings was that the consumer price index and inflation rate was not readily available and during the past three decades of instability, the economy was facing many economic fluctuations.

By considering all the mentioned challenges and by guidance of tax guidelines, a straight-line method was used. A ten years useful life for equipment's has been considered in this study. There is equipment that might has been used for more than their useful live, but still they are useful and may be used for many more years. For the building cost, since the initial construction costs of building are not available and the rent for building space based on the market rate was considered depreciation cost of the building in this study.

**Total Cost Determination**

Total cost was determined by the summation of total direct costs and indirect costs mathematically.

Total Cost (TC) =Total Direct Cost (TDC) + Indirect Cost (IDC)

Total Cost =TDC (Labor Cost + Material Cost + Capital Cost) + IDC (Labor Cost + Material Cost + Capital Cost)

**Calculating Unit Cost**

Unit cost was calculated by dividing the total cost by the number of patient visits for outpatient units and mathematically by the number of hospitalization days and discharge for inpatient units.

Unit Cost of Hospital = Total cost / Number of Patient Visit

Unit Cost of Inpatient Cost Center = Total Cost of Inpatient Cost Center / Number of Patient Admitted

Unit Cost of Outpatient Cost Center = Total Cost of Outpatient Cost Center / Number of patient visit

Unit Cost of Inpatient Day = Total Cost / Length of Stay

## 4.5 Assumptions

There are additional assumptions made in this study.

It is assumed that all quality of the same services provided by two hospitals is the same.

The opportunity cost of land is not included in this study.

It is assumed that all medical equipment, nonmedical equipment and vehicles have a useful life of 10 years, because some of assets might have been used more than their useful life, but still they are used and maybe used for some future years as well. Since the usage of buildings space were not certain, it was assumed that building is used by all departments and it was allocated to general cost center and then it was allocated to total expenditures, the total expenditure was allocated to other departments. This assumption was made for the equipment as well, because the list of

equipment did not show that which item exactly belong to which departments or used by which department.

**Table 4: Summary of Data Collection and Data Analysis Process**

| Steps | Sources of Data | Assumption |
|---|---|---|
| Data were collected from hospitals' records as follow:<br>1. General information on hospitals<br>2. Hospital utilization statistics<br>3. Expenditures including recurrent expenditures and capital expenditures<br>4. Human resources including monthly salaries, position, functions and places of personnel work<br>5. Statistics of Ancillary Department | Data were collected from the following sources:<br>1. Administration department<br>2. Medical record and HMIS units of Administration department<br>3. Administration department and pharmacy unit of Ancillary Department<br>4. HR and accounting units of Administration department<br>5. Ancillary department units including pharmacy, lab, blood-bank, x-ray, ultrasound, endoscopy and anesthesia | |
| Three general cost centers were identified that include General Administration, Ancillary (intermediate), and Clinical Departments.<br>• General Administration and Ancillary Departments are indirect cost centers and Clinical Department is direct cost center.<br>• Each of three departments | Information on division of hospitals was collected from General Administration Department. | |

| | | |
|---|---|---|
| has been divided into different sub cost centers. | | |
| Allocation of costs to the each cost center according to services they provide.<br>• Step-down method of cost allocation method was used.<br>• Direct costs including costs of personnel and other recurrent costs were allocated directly to related cost centers.<br>• Indirect costs were allocated to general administration department and then to ancillary department and finally to clinical department IPD and OPD units. | | Assumptions:<br>It is assumed that the quality of services provided in both hospitals, are the same.<br>The opportunity cost of land is not included in the study.<br>It is assumed that all equipment has useful life of ten years.<br>It is assumed that building has useful life of 50 years. |
| Unit costs<br>First, the total costs were calculated and allocated to ancillary and then final cost center. Total costs were broken down to different IPD and OPD cost centers. Total costs of each IPD and OPD units were divided into number of hospitalization days and number of OPD visits, based on it the unit costs of per bed day and per OPD visit were found. | | |

# CHAPTER V

# ANALYSIS AND RESULTS

Mirwais and Nangarhar hospitals are two regional hospitals located in Kandahar city in south and Nangarhar center, Jalalabad city, in the east of the country. These hospitals are general hospitals providing numerous specialties and subspecialties. Both hospitals were established in 1970s and then were changed to regional hospitals in 2006. Based on the MoPH Hospital Strategy and EPHS documents, both hospitals should have the same organizational structure and function, but in reality there are some differences in terms of the number of clinical services, the number of beds and the number staff.

Both hospitals' organizational structure is divided into three main cost centers, general administration, ancillary and clinical departments. The general administration department is divided to administration, maintenances, kitchen and laundry. The ancillary department is divided based on the available ancillary and diagnostic services to pharmacy, laboratory, blood bank, X-ray, ultrasound, endoscopy and anesthesia. The clinical department is divided based on the structure of the available clinical services in the hospital. Mirwais Regional Hospital has the following wards: internal medicine IPD &OPD, general surgery IPD&OPD, obstetrics and gynecology IPD & OPD, pediatrics IPD & OPD, ENT IPD & OPD, eye IPD & OPD, mental health OPD, stomatology OPD, tuberculosis OPD and Skin OPD. Nangarhar Regional Hospital has internal medicine IPD &OPD, general surgery IPD & OPD, obstetrics and gynecology IPD & OPD, pediatrics IPD & OPD, orthopedics IPD & OPD, ENT

IPD & OPD, eye IPD & OPD, Infectious diseases IPD & OPD, mental health OPD and stomatology OPD.

Nangarhar regional hospital has orthopedics IPD and OPD and infectious diseases IPD and OPD, but Mirwais Regional Hospital does not have these two wards. Mirwais regional hospital has tuberculosis OPD and skin OPD but Nangarhar regional hospital does not have these two wards. Other IPD and OPD wards are the same in both hospitals.

## 1.1 Utilization of Hospitals

The following table shows data of utilization, bed occupancy rate and average length of stay in both hospitals.

**Table 5: Data on Utilizations of Hospitals**

| Hospital | OPD Visit | Number of Admission | Hospitalization days | ALOS | BOR |
|---|---|---|---|---|---|
| Mirwais Regional Hospital | 163,257 | 32687 | 95545 | 3 | 75% |
| Nangarhar Regional Hospital | 373,542 | 44582 | 128730 | 2.9 | 82% |

As it is displayed in the above tables, the total number of beds, total number of staff, total number outpatient visits, total number of inpatient admission are higher in Nangarhar Regional Hospital than Mirwais Regional Hospital. The average length of stay between two hospitals is almost the same with 3 days for Mirwais Regional Hospital and 2.9 days for Nangarhar Regional Hospital. The bed occupancy rate of Nangarhar Regional Hospital is 7% higher than Mirwais Regional Hospital.

## 1.2 Human Resources and Staffing

The following table shows some basic information and data on human resources and staffing of two hospitals.

**Table 6: Human Resources and Staffing**

| Hospital | Beds | Number of Staff | Number of Doctors | Number of Nurses | Number of Midwifes | Number of Technician | Admin & Supportive Staff |
|---|---|---|---|---|---|---|---|
| Mirwais Regional Hospital | 350 | 426 | 88 | 183 | 12 | 15 | 128 |
| Nangarhar Regional Hospital | 428 | 542 | 125 | 132 | 32 | 53 | 200 |

There are differences in number of staff between two hospitals. We have 132 nurses in Nangarhar Regional Hospital, while it is 183 for Mirwais Regional Hospital.

## Categories of Staff by Gender

There are shortages of female staff in both hospitals. The following table shows the number of staff categories by gender.

**Table 7: Breakdown of staff by gender**

| Hospital | Mirwais Regional Hospital | | | Nangarhar Regional Hospital | | |
|---|---|---|---|---|---|---|
| Staff | Total | Female | Male | Total | Female | Male |
| Total Staff Number | 426 | 40 | 386 | 542 | 137 | 405 |
| TOTAL Doctors | 88 | 5 | 83 | 125 | 27 | 98 |
| TOTAL Nurses | 183 | 4 | 179 | 132 | 34 | 98 |
| TOTAL Midwifes | 12 | 10 | 2 | 32 | 32 | 0 |
| TOTAL Technicians | 15 | 0 | 15 | 53 | 6 | 47 |
| TOTAL Others | 128 | 21 | 107 | 200 | 38 | 162 |

It is clear from the above table that the number of female staff is very low than number of male staff in both hospitals, but it is much lower in Mirwais hospital than Nangarhar hospital. Comparing to National hospitals in Kabul the number of female doctors and nurses are lower in all the provinces, but much lower in remote provinces

and insecure provinces. According to HMIS report for 2012, female doctors are around 20% of all doctors and male doctors are around 80% in all the country. Around 18 % of nurses are female and 82% of nurses are male around the country. Around 98% of midwives are female and 2% are male. In health technicians and other supporting staff, around 15 percent of them are female and around 85% of them are male in all the country (MoPH, 2012).

The following table shows the breakdown of staff and the ratio of beds per staff in both hospitals.

**Table 8: Breakdown of Staff**

| Staff Breakdown | Number of Staff | | Ratio of Beds per Staff | | Ratio of Occupied Beds per Staff | |
|---|---|---|---|---|---|---|
| | Mirwais Regional Hospital | Nangarhar Regional Hospital | Mirwais Regional Hospital | Nangarhar Regional Hospital | Mirwais Regional Hospital | Nangarhar Regional Hospital |
| Total Doctors | 88 | 125 | 4.0 | 3.4 | 3.0 | 2.8 |
| Total Nurses | 183 | 132 | 1.9 | 3.2 | 1.4 | 2.7 |
| Total Midwifes | 12 | 32 | 29.2 | 13.4 | 21.8 | 11.0 |
| Total Technicians | 15 | 53 | 23.3 | 8.1 | 17.5 | 6.7 |
| Total Others | 128 | 200 | 2.7 | 2.1 | 2.0 | 1.8 |

As it shown in the table, Mirwais Regional Hospital has more staff than Nangarhar Regional Hospital, while the number of beds and doctors are higher in Nangarhar Regional Hospital. The number of midwives and technician are smaller in Mirwais Regional Hospital compared to Nangarhar Regional Hospital.

## 1.3 Total Cost of Hospitals

The total cost of Mirwais Regional Hospital in the year 1390 was USD 5,500,170 and for Nangarhar Regional Hospital, it was USD 4,952,037. Comparing against the number of beds and total number of inpatient admissions and outpatient

discharges, the total cost of Mirwais Regional Hospital is higher than total cost of Nangarhar Regional Hospital.

**Cost of General Administration Departments**

Costs of general administration departments are called overhead costs that are made of all fixed and variables costs incurred by general supportive departments. These costs are comprised of costs of admin and all general supportive staff, materials and capital costs that are summarized as costs of administration, maintenances, kitchen and laundry. These costs include both fixed costs and variable costs. Fixed costs in this category consist of share of depreciation of building and share of equipment and durable goods. Variable costs include costs of personnel, supplies, materials, electricity, fuel, transportation and recurrent costs.

**Costs of Ancillary Departments**

Costs of the ancillary departments are comprised of two parts. The first part includes direct costs of personnel, supplies and materials allocated directly to ancillary departments and the other part is costs that were allocated from general administration departments to the ancillary departments.

**Costs of Clinical Departments**

Costs of clinical departments are the summation of direct costs incurred by the delivery of clinical services and costs that was allocated from general and ancillary departments to clinical departments. These costs are included fixed and variable costs. Fixed costs include depreciation of buildings and depreciation of medical and nonmedical equipment. Variable costs include costs of general departments allocated to clinical departments, recurrent costs of delivery of each final clinical service, costs of personnel, costs of drugs and other medical and nonmedical supplies.

The following table shows the total costs of each hospital and based on the step down method general cost centers, ancillary cost center and clinical cost center.

**Table 9: Breakdown of Costs by Cost Center**

| Cost Centers | Hospital | |
|---|---|---|
| | Mirwais | Nangarhar |
| Cost of General Departments | 1,279,546 | 1,226,260 |
| General as % of Total | 23% | 25% |
| Cost of Ancillary Departments | 2,823,618 | 2,603,331 |
| Ancillary % of Total | 51% | 53% |
| Cost of Clinical Departments | 1,397,006 | 1,122,446 |
| Clinical as % of Total | 25% | 23% |

The findings show that the distribution and proportion of costs by each type of cost centers in two hospitals are quite similar. In Mirwais Regional Hospital, the cost of general departments made up 23% of total cost and this figure is 25% for Nangarhar Regional Hospital. The cost of ancillary department of Mirwais Regional Hospital was 51% of its total cost and for Nangarhar regional hospital; it was 53% of the total cost. The clinical cost of Mirwais Regional Hospital was 25% of its total cost and in Nangarhar Regional Hospital; clinical cost was 23% of its total cost. The proportion of the ancillary cost for both hospitals is high compared to National Hospitals. In a separate study (MoPH, 2012), it was shown the general costs for national hospitals are higher and made up around 48% of total costs, the ancillary department costs was 16% and the clinical costs 36%. In National Hospitals, a bigger proportion of expenditures are devoted to general costs, while in Mirwais and Nangarhar Regional Hospitals the greatest proportion of expenditures is devoted to ancillary costs. The reason behind the high proportion of ancillary costs in these two regional hospitals is the high expenditure of pharmacy costs in the year 1390.

Pharmacy and medical supplies expenditure of Mirwais Regional Hospital accounted for 46% of the total costs and in Nangarhar Regional Hospital, drugs and pharmacy 50%. There may be different reasons why the pharmacy costs is higher. The pharmacy does not just distribute drugs, it is responsible for providing other lab and medical supplies for daily use as well and the second reason is that drug and pharmaceutical supplies are mainly imported from abroad and it can be the issue of rational use of drugs as well, because there are no standard on rational usage of drug.

Large procurement of drugs and medical supplies and equipment for hospitals under the control of MoPH and Hospital Reform Project carried out through the central MoPH and the hospitals management (MoPH, 2010) handles other procurement. In hospitals that contracted out to NGO, the related NGO procure drugs, medical supplies, equipment and other materials for the hospitals. The drugs are purchased based on the list of EPHS drug for each level of hospital. Pharmaceutical department of MoPH has developed essential lists of drugs for BPHS and EPHS.

## 1.4 Categories of Costs by Input Items

Personnel, drugs and pharmacy, capital expenditures, food and other supplies and utilities are major cost items that contribute to total cost of Mirwais and Nangarhar Regional Hospitals.

Mirwais Regional Hospital has a total area of land approximately 90,000 square meters. The building area of hospitals approximately 12000 square meters. The building was built in 197s and it is still in use. The cost of land has not been included in this study. The costs of the building was not calculated based on the accounting method of depreciation or the financial method of replacement costs because of the

problem of non-availability of inflation rate during the past 3 decades. Monthly rent of building space was used to represent depreciation cost of the building and then was summed up for one year. The rent was estimated based on the market rent for the same space in the same area of the city separately for both hospitals. The total area of Nangarhar Regional Hospital is estimated to be around 8000 square meters. The building was built in 1970s. The depreciation cost of the Nangarhar Regional Hospital was estimated in the same way as Mirwais Regional Hospital.

Costs of equipment were calculated with some assumptions. Some of the equipment was used more than their useful life. While some were still in good conditions, for most of them the purchasing time was not clear and some of the equipment's purchasing price was missing. A useful life of 10 years was therefore assumed for all equipment (including those with useful life of less than ten years and those with useful life of more than ten years). Based on the Ministry of Finance guideline, the straight-line method of depreciation was applied.

Costs of drug, pharmacy and medical supplies were based on the list of drug and supplies purchased for one year and then allocated to ancillary and clinical departments based on the percentage of usage by those departments.

Costs of food for patients was computed form the food and kitchen supplies list for one year and then it was allocated to kitchen cost centers and from the kitchen cost centers it was allocated to final inpatient clinical departments.

Other recurrent expenditures like electricity and other minor services were allocated to general departments.

**Table 10: Breakdown of Cost by Main Inputs**

| | Mirwais Regional Hospital | | Nangarhar Regional Hospital | |
|---|---|---|---|---|
| | Costs | Proportion | Costs | Proportion |
| Salaries | 1,770,835 | 32% | 1,494,839 | 30% |
| Drugs and Pharmacy | 2,540,000 | 46% | 2,464,157 | 50% |
| Food | 279,950 | 5% | 198,000 | 4% |
| Capital expenditures (Depreciation Cost) | 386,828 | 7% | 387,068 | 8% |
| Other Expenditures | 522,557 | 10% | 407,973 | 8% |
| Total Expenditure | 5,500,170 | 100% | 4,952,037 | 100% |

Drug and pharmacy costs accounted for the greatest part of the total costs in both Mirwais and Nangarhar Regional Hospitals: 46% and 50% of costs respectively. The second biggest input item was personnel salaries: 32% for Mirwais and 30% for Nangarhar Regional Hospitals respectively. Capital costs made up only 7% of total costs in Mirwais and 8% of total costs in Nangarhar Hospitals. Food Items were 5% of total costs of Mirwais Regional Hospital and 4% at Nangarhar Regional Hospital. The breakdown in both hospitals shows a similar trend of distribution. In both hospitals, costs were driven by drugs and pharmacy and then by personnel salaries.

## 1.5 Total Cost Breakdown by Clinical Departments

Mirwais Regional Hospital has 6 IPD departments and 10 OPD departments. Nangarhar Regional Hospital has 8 IPD departments and 10 OPD departments. The following tables show the breakdown of total costs of each hospital by IPD and OPD departments and then the costs of IPD and OPD departments are broken-down into different IPD and OPD departments.

The following table shows the breakdown of IPD cost by IPD departments.

**Table 11: Breakdown of IPD Cost by Departments**

| Total Cost of IPD Breakdown by Department | Mirwais | Nangarhar |
|---|---|---|
| Internal Medicine IPD | 981,451.00 | 472,936 |
| General Surgery IPD | 2,112,907.00 | 1,870,867 |
| OB/GYN and Maternity IPD | 554,058.00 | 939,238 |
| Pediatrics IPD | 975,557.00 | 488,619 |
| Orthopedics IPD | | 162,451 |
| ENT IPD | 255,752.00 | 79,968 |
| Eye IPD | 93,863.00 | 63,138 |
| Infectious Diseases IPD | | 189,487 |
| Total IPD Cost | 4,973,588.00 | 4,266,704 |

As it is explained in the table, General Surgery Department has the highest total costs in both hospitals. General Surgery costs accounts 42% and 44% of total IPD department's costs of Mirwais and Nangarhar Regional Hospitals.

**Table 12: Total OPD Costs by Departments**

| Departments | Mirwais | Nangarhar |
|---|---|---|
| Internal Medicine OPD | 82014 | 76,069 |
| General Surgery OPD | 209411 | 189,467 |
| OB/GYN and Maternity OPD | 68,035 | 53,058 |
| Pediatrics OPD | 37,451 | 70,089 |
| Orthopedics OPD | | 51,073 |
| ENT OPD | 18,877 | 39,223 |
| Eye OPD | 7,861 | 8,227 |
| Infectious Diseases OPD | | 70,376 |
| Mental Health OPD | 24582 | 77,231 |
| Stomatology OPD | 22473 | 50,520 |
| Tuberculosis OPD | 42300 | |
| Skin OPD | 13578 | |
| Total OPD Cost | 526,582 | 685,333 |

The total IPD cost of Mirwais hospital is higher compared to Nangarhar hospital. The total IPD cost of Mirwais accounts for 90% of total costs of the hospital and its total OPD costs accounts for 10% of total costs. The total IPD costs of Nangarhar hospital accounts for 84% of its total costs and the total OPD costs account for 14% of its total costs.

## 1.6 Average Cost per Bed Day and Outpatient Visit

### Average Cost per Bed Day

Based on table 7, total numbers of 32,687 patients were admitted to Mirwais hospital and 30513 patients were discharged from hospital in year 1390 and 1174 died in the hospital. In Nangarhar Hospital 44,582, patients were admitted and 43,883 of admitted patients were discharged in the same year and 699 patients among the admitted died.

There are variations in number of admitted patients and hospitalization days among inpatient departments within hospital. The cost per bed day was calculated separately for each inpatient department by dividing the total costs of each inpatient department by number of hospitalization days. The following table shows the total costs, hospitalization days and average or unit cost or cost per day for each IPD departments of both hospitals.

**Table 13: Average Cost per Bed Day**

| IPD Departments | **Mirwais Hospital** | | | **Nangarhar Hospital** | | |
|---|---|---|---|---|---|---|
| | Total Cost | Hospitalization Days | Cost per Bed Day | Total Cost | Hospitalization Days | Cost per Bed Day |
| Internal Medicine IPD | 981,451 | 12070 | 81 | 472,936 | 19200 | 25 |
| General Surgery IPD | 2,112,907 | 51635 | 41 | 1,870,867 | 36990 | 51 |
| OB/GYN and Maternity IPD | 554,058 | 3976 | 139 | 939,238 | 13908 | 68 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Pediatrics IPD | 975,557 | 22770 | 43 | 488,619 | 27222 | 18 |
| Orthopedics IPD | | | | 162,451 | 13188 | 12 |
| ENT IPD | 255,752 | 3108 | 82 | 79,968 | 2070 | 39 |
| Eye IPD | 93,863 | 1986 | 47 | 63,138 | 1232 | 51 |
| Infectious Diseases IPD | | | | 189,487 | 14920 | 13 |

The above table shows that general surgery department in both hospitals has the highest total cost, while the unit cost of general surgery is the lowest in Mirwais hospital and is the second higher unit cost in Nangarhar hospital. The numbers of hospitalization days are also the highest in both hospitals, because the number of surgery admission is high in these two hospitals. The two hospitals are located in two insecure areas of the country. The cases of accidents, bombing, military operations and other insurgency activities are higher in southern and eastern regions of the country. Internal medicine, pediatrics, OB/GYN, ENT and Eye departments have the second, third, fourth, fifth and sixth high totals costs respectively in Mirwais hospital. There is a wide difference between the distributions of total IPD costs between departments in both hospitals. General surgery IPD accounts for 42% of total IPD costs (highest) in Mirwais hospital and 44% of total cost in Nangarhar hospital and Eye account for 2% of total IPD costs in Mirwais hospital and 1% of total costs of Nangarhar hospital (lowest). The unit costs are not the same as the total costs of each IPD departments in both hospitals. The OB/GYN departments have the highest unit costs in both hospitals, because they the OB/GYN departments have lower number of hospitalization days. Since there has been no report of neonatal care in both hospitals, the neonatal care costs might also be associated in OB/GYN costs.

**Average Cost per Outpatient Visit**

Based on table 7, total outpatient visits in Mirwais Regional Hospital were 163,257 patients and in Nangarhar Regional Hospital were 373,542 patients for one year. Total costs of OPD departments were USD 526,582 and USD 685,333 respectively. The unit cost of OPD visit was calculated by dividing the total costs of each OPD department by the number of the visits of that OPD for one year. The following table shows the total costs of each OPD, number of visits, and unit costs of each OPD of each hospital

**Table 14: Cost per OPD Visit of Each OPD Ward**

| OPD Departments | Mirwais Hospital | | | Nangarhar Hospital | | |
|---|---|---|---|---|---|---|
| | Cost | OPD Visits | Cost per OPD Visit | Cost | OPD Visits | Cost per OPD Visit |
| Internal Medicine OPD | 82014 | 27199 | 3 | 76,069 | 88000 | 1 |
| General Surgery OPD | 209411 | 29757 | 7 | 189,467 | 30960 | 6 |
| OB/GYN and Maternity OPD | 68,035 | 8946 | 8 | 53,058 | 17232 | 3 |
| Pediatrics OPD | 37,451 | 45043 | 1 | 70,089 | 57600 | 1 |
| Orthopedics OPD | | | | 51,073 | 18000 | 3 |
| ENT OPD | 18,877 | 18393 | 1 | 39,223 | 28800 | 1 |
| Eye OPD | 7,861 | 10326 | 1 | 8,227 | 26250 | 0.3 |
| Infectious Diseases OPD | | | | 70,376 | 63500 | 1 |
| Mental Health OPD | 24582 | 6349 | 4 | 77,231 | 10800 | 7 |
| Stomatology OPD | 22473 | 7738 | 3 | 50,520 | 32400 | 2 |
| Tuberculosis OPD | 42300 | 636 | 67 | | | |
| Skin OPD | 13578 | 8870 | 2 | | | |

The above table shows the unit cost of OPD visit of both hospitals. As we see in the table Tuberculosis OPD ward with USD 67 per visit has the highest unit cost, then Obstetrics and Gynecology with OPD unit cost of USD 8 and General Surgery OPD with unit cost of USD 7, have the second and third highest OPD unit cost

respectively. Mental health OPD with the cost of USD 7 has the highest OPD unit cost in Nangarhar hospital and the second highest unit cost of OPD belongs to General Surgery that is USD 6. Eye, ENT, and Pediatrics with unit costs of USD 0.3 to USD 1 have the lowest OPD unit costs.

## 1.7 Sensitivity Analysis:

As the above results show, there are differences between unit costs of different IPD and OPD departments. Mirwais hospital has higher costs per bed day in OB/GYN, ENT and Internal Medicine cost than the same departments in Nangarhar hospital. For internal medicine IPD the unit cost of Mirwais hospital is three time higher than unit cost of internal medicine of Nangarhar hospital. Within the Mirwais OB/GYN IPD ward has the highest cost per bed day (USD 139) and the General Surgery has the lowest cost per bed day (USD 41). Within Nangarhar, hospital OB/GYN IPD ward has highest cost per bed day (USD 68) and the Orthopedics IPD ward has the lowest cost per bed day (USD 12). In both Mirwais and Nangarhar hospitals drug and pharmacy costs accounted for the greatest part of the total costs: 46% and 50% of costs respectively. The findings were based on the assumption about the costing of capital. It was assumed that the opportunity cost of land was not included in the study. The useful life of the buildings was assumed 50 years. The useful life of all equipment was assumed 10 years. Based on the tax guideline of MoF, some of the nonmedical equipment assumed to be 3 to 5 years.

Based on the finding and assumption made on this study, I will use three scenarios and see how the changes in these three parameters will affect the unit costs each hospital.

**Scenario 1:** By doing sensitivity analysis, we would like to see if the useful life of equipment was changed from 10 years to 5 years.

The result after sensitivity analysis shows that the unit cost of OB/GYN IPD is still higher. In result of increase in total costs due to change in capital costs, the cost per bed day in OB/GYN in both hospital increased more than other units. The cost per bed day of OB/GYN of Mirwais hospital increased from USD 139 to USD 143 and from USD 68 to USD 70 for Nangarhar hospital.

**Scenario 2:** In this scenario, the double declining method of depreciation was used instead of straight-line-method to see if this method of depreciation affects the unit costs. This method was used based on the same useful life year (10 years) of assets used in initial analysis and a depreciation rate of 20% was applied. There have been no significant changes in IPD and OPD unit costs. The unit costs are quite the same as the initial finding.

**Scenario 3:**

Currently based on casual observations of the current health system, drug use can be divided into foreign drugs and domestic drugs. About 90% of the all drugs consumption in the country is from foreign drugs, the other 10% domestic drugs. In addition, foreign drugs are about twice expensive as domestic drugs. Scenario 3 is such that the composition of drug consumption changes from 90:10 to 50:50.

For the example, the cost for drugs in Mirwais hospital was USD 2,540,000. We know 90% of drugs were foreign and 10% was domestic, which means:

$$2540000 = [(0.1q) \times P_{domestic}] + \left[(0.9q) \times P_{foreign}\right]$$

We know also $2P_{domestic} = P_{foreign}$

$$2540000 = [(0.1q) \times P_{domestic}] + [(0.9q) \times 2P_{domestic}] \ldots\ldots\ldots (1)$$

Therefore, if the composition changes to 50:50, the new equation will be as below.

$$[(0.5q) \times P_{domestic}] + [(0.5q) \times 2P_{domestic}] = New\ Cost$$

$$1.5P_{domestic} = New\ Cost \ldots\ldots\ldots (2)$$

Based on: $New\ Cost = \frac{2540000}{1.9} \times 1.5$

$New\ Cost = USD\ 2{,}005{,}263$

If we use the equations 1 and 2 for the Nangarhar hospital then we will find the new cost as follow.

$$New\ Cost = \frac{2{,}464{,}157}{1.9} \times 1.5$$

$New\ Cost = USD\ \ 1{,}945{,}387$

The results of these three scenarios are summarized in the table 15. The unit costs calculated based on these scenarios show that scenario three has the highest impact and scenario 2 has lower impact, while scenario 2 has no significant impact on the unit of IPD and OPD.

**Table 15: Unit Cost of IPD and OPD Based on the Results of Sensitivity Analysis**

| IPD &OPD | Wards | Mirwais Hospital | | | | Nangarhar Hospital | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Initial | Scenario 1 | Scenario 2 | Scenario 3 | Initial | Scenario 1 | Scenario 2 | Scenario 3 |
| | | Unit Cost | Unit Cost | Unit Cost | Unit Cost | Unit Cost | Unit Cost | Unit Cost | Unit Cost |
| IPD | Internal Medicine | 81 | 83 | 81 | 73 | 25 | 25 | 24 | 23 |
| | General Surgery | 41 | 42 | 41 | 37 | 51 | 52 | 50 | 44 |
| | OB/GYN and Maternity | 139 | 143 | 139 | 122 | 68 | 70 | 67 | 60 |
| | Pediatrics | 43 | 44 | 43 | 39 | 18 | 19 | 18 | 16 |
| | Orthopedics | | | | | 12 | 13 | 12 | 13 |
| | ENT | 82 | 84 | 82 | 77 | 39 | 40 | 38 | 33 |
| | Eye | 47 | 49 | 47 | 48 | 51 | 53 | 51 | 47 |
| | Infectious Diseases | | | | | 13 | 13 | 13 | 12 |
| ODP | Internal Medicine | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 |
| | General Surgery | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 5 |
| | OB/GYN and Maternity | 8 | 8 | 8 | 6 | 3 | 3 | 3 | 3 |
| | Pediatrics | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Orthopedics | | | | | 3 | 3 | 3 | 3 |
| | ENT | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Eye | 1 | 1 | 1 | 1 | 0.3 | 0.3 | 0.3 | 0.3 |
| | Infectious Diseases | | | | | 1 | 1 | 1 | 1 |
| | Mental Health | 4 | 4 | 4 | 4 | 7 | 7 | 7 | 7 |
| | Stomatology | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 |
| | Tuberculosis | 67 | 68 | 66 | 57 | | | | |
| | Skin | 2 | 2 | 2 | 2 | | | | |

As table shows, the impact of the sensitivity analysis on OPD is generally insignificant except Tuberculosis OPD in Mirwais hospital that is mainly affected in the changes of drug prices. In IPD wards, by decreasing the number of useful year of equipment in scenario1 the unit costs are increases between USD 1 to USD 4 in Mirwais hospital and between USD 1 to three in Nangarhar Hospital. Scenario 2 has not has significant impact and it is quite the same as the initial unit costs. Scenario 3 is significant in IPD departments of both hospitals. Unit costs of IPD departments in Mirwais hospital decreased between the lowest USD 4 to the highest USD 17 per bed day. This figure is the lowest USD 1 to the highest USD 7.

# CHAPTER VI

# DISCUSSION AND CONCLUSION

## 6. 1 Discussion and Conclusion

This study estimated unit cost of IPD and OPD departments of Mirwais and Nangarhar Regional Hospitals in the year 1390. The study found that there were some differences in terms of the management of two hospitals, staffing, proportion of nurses and doctors and as well as utilization rates. Considering number of beds and the utilization, the total costs of Mirwais Regional Hospital was higher than Nangarhar Regional Hospital. The Total cost of Mirwais Regional Hospital was USD 5,500,170 while the total cost of Nangarhar Regional Hospital was USD 4,952,037, despite the fact that utilization of Nangarhar hospital was higher than Kandahar hospital in both IPD and OPD.

A big proportion of expenditures were going to drug and pharmacy accounting for 46% of Mirwais and 50% of Nangarhar hospitals' total costs. The second most costly item was personnel salaries, accounting for 32% and 30% of Mirwais and Nangarhar Regional Hospitals' total costs respectively. The capital costs accounted for 7% and 8% of the total cost for Mirwais and Nangarhar Regional Hospitals respectively. Compared to Kabul National Hospitals the expenditure for drug and pharmacy of the two hospitals was higher. One of the reasons may be that National Hospitals were directly under the management of central MoPH and they had a fixed budget for purchasing of drug and medical supplies quarterly, while these two hospitals had some autonomy (MoPH, 2012). Another reason can be the high price of imported drugs that based on the causal observation the use of foreign drugs is high.

Costs of IPD departments made up the greater proportion of total costs in both hospitals. Total IPD costs accounted for 90% of the total costs and cost of OPD departments accounted for 10% in Mirwais Regional Hospital. IPD costs accounted for 86% of the total cost and OPD costs accounted for 14% for Nangarhar regional hospital. Among the IDP departments of Mirwais and Nangarhar Regional Hospitals, OB/GYN department with a per bed day cost of USD 139 in Mirwais and USD 68 in Nangarhar hospitals was the most costly department. General Surgery IPD with the cost of USD 41 had the lowest cost per bed day in Mirwais hospital and the Orthopedics IPD with the cost per bed day of USD 12, had the lowest cost per bed day in Nangarhar hospital. Compared to Nangarhar hospital, Mirwais hospital had a higher average unit cost in IPD. Among the IPD departments, only General Surgery IPD and Eye IPD departments had lower per bed day costs than Nangarhar hospital.

Generally, the Mirwais hospital is smaller in terms of number of beds and number of utilizations comparing to Nangarhar hospital. The Mirwais hospital is more expensive and incurs higher total costs and unit costs than Nangarhar hospital, despite the bulk purchasing of drugs and other supplies. The Nangarhar hospital is cheaper and incurs lower total costs and units than Mirwais although comparing to government, the NGO's purchasing of drugs and other medical supplies is in lower scale than the government purchasing.

## 6. 2 Limitations of the Study

The objective of this study was to analyze unit cost and total costs of Mirwais and Nangarhar Regional Hospitals for the year 1390 (March 21, 2011 to March 20, 2012). To conduct a cost study we need to look to economic costs and see the contributions of fixed and variable costs in a longer period to find out some efficiency

is gained over time. In this study, the costing is based on the hospitals prospective and it does not include all costs relating to hospitals and patients. The cost of legislations and related personnel, material and capital in the MoPH and the relevant NGO were not included in this analysis, and their inclusion would increase the unit costs.

Detailed data on some expenditures items, especially capital equipment of the hospitals were not available. The initial price of the buildings and the exact space of the area on which hospitals were built were not exactly recorded.

This study is based on one-year data, so it may be difficult to look to different aspects of cost and its application for efficiency analysis as well as decision making for improvement of the management of the hospital.

### 6. 3 Recommendations

The administration structure of the hospitals was not exactly what was predicted in EPHS documents and the proportion of doctors and nurses seemed different in two hospitals. There were also differences in clinical wards between two hospitals. Based on EPHS, all regional hospitals should have the same structures and provide the same services this proved untrue.

There were differences in bed occupancy rate across different wards. This implies that resources among hospital wards should be reallocated. The majority of costs come from drugs and pharmaceutical supplies. As it was explained, earlier drugs and medical supplies accounted for highest proportion of total costs. As the result of sensitivity analysis shows, if the hospitals can reduce the use of foreign drug by using domestic drugs to 50 percent, it can decrease the unit cost of IPD. MoPH and government need to look for domestic production of drug and improve the environment for private sector production of drug inside the country.

Although, the proportion of capital costs is lower in total costs of hospitals. The results of showed that if we decrease the useful life of the equipment the unit cost is increasing. The hospitals can use the capital items for longer period and avoid unnecessary replacement of the equipment.

# REFERENCES


Afghanistan Management Information Services (2013). Administration maps, AMIS Publication

Axynonova, V., Peyrouse, S., Laruelle, M. (2013). The Afghanistan-Central Asia Relationship. FRID Think Thank for Global Action.

Barfield T (2010). Afghanistan: a cultural and political history. Princeton publication

Butler GRJ. (1995). Cost analysis of hospital. Kluwer Academic Publisher

Caplan, D. (2012). Management accounting concepts and techniques. University at Albany. Available :from : http://denniscaplan.fatcow.com [December 2012].

Central Statistics Organization of Afghanistan. (2011). Afghanistan national account.

Central Statistics Organization of Afghanistan. (2005), Kandahar: Socio-economic and demographic profile. CSO Publication.

Drummond M.F. Sculpher, M.J. Torrance, G.W. O. Brien, BJ. Stoddart, G.L. (2005). Methods for economic evaluation of health care programs. Third edition, Oxford University Press

Flessa S (1998). The costs of hospital services: a case study of Evangelical Lutheran Church hospitals in Tanzania, Journal of Health Policy and Planning, 13(4): 397-407.

Flessa S., Tran Dung N (2004). Costing of services of Vietnamese hospitals: identifying costs in one central, two provincial and two district hospitals using a standard methodology. International Journal of Health Planning and Management, 19(1):63-77.

Gapenski L. C. (2008). Health Care Finance; an introduction to accounting and financial management. AUPHA.

Gapenski C. Louis (2007). Understanding health care financial management, 5th edition. AUHPHA.

Guang-de Z & Litvinsky (1996). Central Asia, the Crossroad of Civilization, UNESCO publication

Hartgraves Al. L. & Morse J. W. (2009) Managerial Accounting. 6th edition, Cambridge.

HealthNet-TPO (2013). Programs in Afghanistan. Available from: http://www.healthnettpo.org/en/1097/programmes-in-afghanistan.html [April 2013].

Hindle, D. (1994). Product costing: the costing of health services, Department of Human Service and Health, Canberra.

IQWIG, (2009), Technical Document: Cost Estimation. Available from http://www.iqwig.de/download/TD_CBA_Cost_Estimation_v_1_0.pdf [December 2012]

Lucey, T. (2003) Management Accounting, 5th edition, Continuum, London

MacConnell, C. R. and Brue, S. L. (2008). Economics: Principles, Problems and Policies. 17th edition, MacGraw-Hill Irwin, Washington.

Mills, J.A. (1991). The cost of the district hospital: a case study from Malawi. Bull World Health Organ. 1993; 71(3-4): 329–339.

MoPH. (2005). Basic package of health services (BPHS).

MoPH. (2006) Essential Package of Hospital Services (EPHS).

MoPH. (2012). Hospital Activities Report. Published by HMIS Department of MoPH.

MoPH. (2011). Hospital sector strategy and policy.

MoPH. (2010). National health account 2008-2009.

MoPH. (2011). Health sector strategic plan.

MoPH. (2013). Health management information system (HMIS).

MoPH. (2012). Afghanistan Mortality Survey (AMS). MoPH publication.

Mogyorosy, Z. Smith P. (2005). The main methodological issues in costing health care services; a literature review. Centre for Health Economics, The University of York

Newbrander W. and Lewis E. (1999), Hospital costing manual, USAID

Peter R. Blood. (2001). Afghanistan: A Country Study. Washington: GPO for the Library of Congress. Available from: http://countrystudies.us/afghanistan/ [May 2013].

Stinson B. James. (2002) Cost Allocation: from the simple to the sublime. Management Accounting Quarterly. Available from: http://www.imanet.org [November 2012]

Tsilaajave, T. (2009). Costing study for selected Hospitals in the Philippines. Health Sector Policy Support Program. Technical Assistance to the Health Sector Policy Support Program in the Philippines (EC-TA HSPSP). Available from: http://www.doh.gov.ph [November 2012]

USAID Afghanistan. (2013) Fact sheet: Nangarhar provinces. Available from: www.afghanistan.usaid.gov [May 2013].

Wagstaff, A. and Barnum, H. (1992). Hospital cost functions for developing countries, World Bank. Available from http://econ.worldbank.org [December 2012]

Webster H. W. (2004), *Accounting for managers*, McGraw-Hill

World Bank. (2013). World Bank Data. Available from: http://data.worldbank.org [January 2013]/.

# APPENDICES

## Appendix A:

### Tables for Data Collection

### Table of Variable Used for Data Collection

| **Variables** | | | | **Does hospital has it.** | **Collection period** |
|---|---|---|---|---|---|
| **General Information** | Number of beds | | | | |
| | Number IPD Patients | | | | |
| | Number of OPD patients | | | | |
| | Number of discharged patients | | | | |
| | Total number of IPD admission days | | | | |
| **Statistics** | Number of Beds in each ward | | | | |
| | Number of Admissions in each ward | | | | |
| | Number of hospitalization days in each ward | | | | |
| | Number of discharged patients | | | | |
| | Number of OPD visits for each ward | | | | |
| **Personnel** | Doctors | | | | |
| | Nurses | | | | |
| | Midwifes | | | | |
| | Technicians | | | | |
| | Supporting staff and etc. | | | | |
| **Expenditure Items** | **Item** | **Total Price in Afghani** | **Ward /Cost Center** | | |
| | Medicine | | | | |
| | Food | | | | |
| | Transport | | | | |
| | Cleaning | | | | |
| | Stationery | | | | |
| | Maintenance | | | | |
| | Power & electricity | | | | |
| | Laundry | | | | |
| | Medical Equipment | | | | |
| | Non-Medical Equipment | | | | |
| | Building | | | From Construction Department of MoPH | |

| **Ancillary Departments' services distribution** | **Ancillary ward** | **Wards** | **Portion of services they received in a year from the ancillary ward** | | |
|---|---|---|---|---|---|
| | Pharmacy | distribution to each ward in a year | for example pharmacy distribution for a year was that Internal Medicine received 20%, general surgery used 12% of the pharmacy, GYN/OBS used 17% of pharmacy and etc. | Yes (need to look all log books to find out how much of medicine was used by each department in one year) | |
| | Laboratory | | | Yes (need to look all log books to find out how much of lab tests was used by each department in one year) | |
| | X-ray | | | Yes (need to look all log books to find out how much of X-ray was used by each department in one year) | |
| | Blood Bank | | | Yes (need to look all log books to find out how much of blood was used by each department in one year) | |
| | Other | | | the same | |

## Appendix B:

### Mirwais Regional Hospital Utilization Details by IPD Wards:

| IPD Wards | Beds | Hospitalization Days | Admissions | Discharges | Deaths | ALOS | BOR |
|---|---|---|---|---|---|---|---|
| Internal Medicine | 45 | 12070 | 3690 | 3495 | 195 | 3.3 | 73% |
| General Surgery | 149 | 51635 | 16835 | 15557 | 278 | 3.3 | 95% |
| OB/GYN and Maternity | 46 | 3976 | 1987 | 1920 | 67 | 2.0 | 24% |
| Pediatrics | 72 | 22770 | 7954 | 7320 | 634 | 2.9 | 87% |
| ENT | 24 | 3108 | 1554 | 1554 | 0 | 2.0 | 35% |
| Eye | 14 | 1986 | 667 | 667 | 0 | 3.0 | 39% |
| Total | 350 | 95545 | 32687 | 30513 | 1174 | 2.9 | 75% |

### Nangarhar Regional Hospital Utilization Details by IPD Ward:

| IPD Wards | Beds | Hospitalization Days | Admissions | Discharges | Deaths | ALOS | BOR |
|---|---|---|---|---|---|---|---|
| Internal Medicine | 60 | 19200 | 6800 | 6700 | 100 | 3 | 88% |
| General Surgery | 121 | 36990 | 10330 | 10316 | 14 | 4 | 84% |
| OB/GYN and Maternity | 53 | 13908 | 12636 | 12624 | 12 | 1 | 72% |
| Pediatrics | 90 | 27222 | 7774 | 7228 | 546 | 4 | 83% |
| Orthopedics | 46 | 13188 | 3396 | 3394 | 2 | 4 | 79% |
| ENT | 8 | 2070 | 690 | 690 | 0 | 3 | 71% |
| Eye | 4 | 1232 | 716 | 716 | 0 | 2 | 84% |
| Infectious Diseases | 46 | 14920 | 2240 | 2215 | 25 | 7 | 89% |
| Total | 428 | 128730 | 44582 | 43883 | 699 | 3 | 82% |

**Table of Percentage of Allocation of Ancillary Departments of Mirwais Hospital to Clinical Department**

| DEPARTMENT | COST CENTER | Pharmacy | Laboratory | Blood Bank | X-ray | Ultrasound | Endoscopy | Anesthesia |
|---|---|---|---|---|---|---|---|---|
| ANCILLARY | Pharmacy | | | | | | | |
| | Laboratory | 4% | | | | | | |
| | Blood Bank | | | | | | | |
| | X-ray | | | | | | | |
| | Ultrasound | | | | | | | |
| | Endoscopy | | | | | | | |
| | Anesthesia | | | | | | | |
| CLINICAL | Internal Medicine IPD | 17% | 41% | 8% | 5% | 25% | 20% | |
| | Internal Medicine OPD | 1% | 10% | | | 10% | 5% | |
| | General Surgery IPD | 40% | 6% | 60% | 60% | | | 65% |
| | General Surgery OPD | 5% | | | 14% | | | |
| | OB/GYN and Maternity IPD | 12% | 10% | 18% | | 40% | 60% | 25% |
| | OB/GYN and Maternity OPD | 2% | | | | 20% | 10% | |
| | Pediatrics IPD | 15% | 24% | 7% | 10% | 5% | 5% | |
| | Pediatrics OPD | | 5% | | | | | |
| | ENT IPD | 3% | 2% | 5% | 5% | | | 6% |
| | ENT OPD | | | | | | | |
| | Eye IPD | | 1% | | | | | 4% |
| | Eye OPD | | | 2% | | | | |
| | Mental Health OPD | | | | | | | |
| | Stomatology OPD | | | | 6% | | | |
| | Tuberculosis OPD | 1% | 1% | | | | | |
| | Skin OPD | | | | | | | |
| TOTAL | | 100% | 100% | 100% | 100 % | 100% | 100% | 100% |

**Table of Percentage of Allocation of Ancillary Departments of Nangarhar Hospital to Clinical Department**

| DEPARTMENT | COST CENTER | Pharmacy | Laboratory | Blood Bank | X-ray | Ultrasound | Endoscopy | Anesthesia |
|---|---|---|---|---|---|---|---|---|
| ANCILLARY | Pharmacy | | | | | | | |
| | Laboratory | 2% | | | | | | |
| | Blood Bank | | | | | | | |
| | X-ray | | | | | | | |
| | Ultrasound | 2% | | | | | | |
| | Endoscopy | | | | | | | |
| | Anesthesia | | | | | | | |
| CLINICAL | Internal Medicine IPD | 7% | 22% | 13% | 5% | 3% | 20% | 12% |
| | Internal Medicine OPD | 1% | 18% | | 2% | 7% | 10% | |
| | General Surgery IPD | 44% | 15% | 60% | 11% | 29% | | 40% |
| | General Surgery OPD | 4% | 2% | | 8% | 20% | | |
| | OB/GYN and Maternity IPD | 19% | 8% | 21% | 1% | 5% | 35% | 38% |
| | OB/GYN and Maternity OPD | 1% | 3% | | 1% | 2% | 25% | |
| | Pediatrics IPD | 9% | 5% | 6% | 2% | 2% | 5% | 2% |
| | Pediatrics OPD | 1% | 7% | | 1% | 2% | 5% | |
| | Orthopedics IPD | | | | 50% | 5% | | 2% |
| | Orthopedics OPD | | | | 10% | 17% | | |
| | ENT IPD | 2% | 1% | | | | | 4% |
| | ENT OPD | 1% | | | | | | |
| | Eye IPD | 1% | | | | | | 2% |
| | Eye OPD | | | | | | | |
| | Infectious Diseases IPD | 3% | 8% | | 1% | 5% | | |
| | Infectious Diseases OPD | 1% | 10% | | 8% | 3% | | |
| | Mental Health OPD | 1% | 1% | | | | | |
| | Stomatology OPD | 1% | | | | | | |
| TOTAL | | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

**Double Declining Balance Method for Calculation of Equipment Cost of Mirwais Hospital**

| End of Year | Asset Cost | Rate depreciation | Amount depreciation | accumulated depreciation | Book Value |
|---|---|---|---|---|---|
| 1 | 1,468,283 | 20% | 293,657 | 293,657 | 1,174,626 |
| 2 | 1,468,283 | 20% | 234,925 | 528,582 | 939,701 |
| 3 | 1,468,283 | 20% | 187,940 | 716,522 | 751,761 |
| 4 | 1,468,283 | 20% | 150,352 | 866,874 | 601,409 |
| 5 | 1,468,283 | 20% | 120,282 | 987,156 | 481,127 |
| 6 | 1,468,283 | 20% | 96,225 | 1,083,381 | 384,902 |
| 7 | 1,468,283 | 20% | 76,980 | 1,160,362 | 307,921 |
| 8 | 1,468,283 | 20% | 61,584 | 1,221,946 | 246,337 |
| 9 | 1,468,283 | 20% | 49,267 | 1,271,213 | 197,070 |
| 10 | 1,468,283 | 20% | 39,414 | 1,310,627 | 157,656 |

**Double Declining Balance Method for Calculation of Equipment Cost of Nangarhar Hospital**

| End of Year | Asset Cost | Rate depreciation | Amount depreciation | accumulated depreciation | Book Value |
|---|---|---|---|---|---|
| 1 | 1,710,681 | 20% | 342,136 | 342,136 | 1,368,545 |
| 2 | 1,710,681 | 20% | 273,709 | 615,845 | 1,094,836 |
| 3 | 1,710,681 | 20% | 218,967 | 834,812 | 875,869 |
| 4 | 1,710,681 | 20% | 175,174 | 1,009,986 | 700,695 |
| 5 | 1,710,681 | 20% | 140,139 | 1,150,125 | 560,556 |
| 6 | 1,710,681 | 20% | 112,111 | 1,262,236 | 448,445 |
| 7 | 1,710,681 | 20% | 89,689 | 1,351,925 | 358,756 |
| 8 | 1,710,681 | 20% | 71,751 | 1,423,676 | 287,005 |
| 9 | 1,710,681 | 20% | 57,401 | 1,481,077 | 229,604 |
| 10 | 1,710,681 | 20% | 45,921 | 1,526,998 | 183,683 |

# BIOGRAPHY

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