ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

The Cost of HIV/AIDS on Health Institutions: the case of three Public Hospitals in Addis Ababa

By

Melesse Tamiru

June 2004
Addis Ababa

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MELESSE TAMIRU SEMEGNE

A thesis submitted to the school of Graduate Studies of Addis Ababa University in partial fulfillment of the requirements for the Degree of Master of Arts in Regional and Local Development Studies

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Approved by Board of Examiners

1.	**Chairman**	**Signature**
2.	**Advisor**	**Signature**
3.	**Examiner**	**Signature**
4.	**Examiner**	**Signature**

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ACCRONYMS AND ABBREVATIONS

AIDS	Acquired Immuno Deficiency Syndrome
ARV	Anti Retro Viral drugs
BSS	Behavioral Surveillance Survey
CSA	Central Statistical Authority
DACA	Drugs Administration and Control Authority
HAART	Highly Active Anti-Retroviral Therapy
HAPCO	HIV/AIDS Prevalence and Control Office
HIV	Human Immuno Deficiency Virus
HSDP	Health Sector Development Programme
MOH	Ministry Of Health
NACS	National AIDS Council Secretariat
NGO	Non Governmental Organization
OPD	Out Patient Department
PHCU	Primary Health Care Unit
PHRD	Policy and Human Resource Development
PWA	Patient with HIV/AIDS
RACS	Regional AIDS Council and Secretariat
SSA	Sub-Saharan Africa
STD	Sexually Transmitted Diseases
TB	Tuberculosis
UNAIDS	United Nations Programme on AIDS
UNFAO	United Nations Food and Agriculture Organization
WHO	World Health Organization

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ABSTRACT

This study is aimed at determining and comparing the cost incurred in treating HIV/AIDS and non-HIV/AIDS patients and the impact on health institutions. Three hospitals in Addis Ababa namely Tikur Anbessa, St. Paul's and Zewditu were included in this study. Essential data were extracted by assessing patient cards and Administrative records retrospectively and filled in a format developed for the purpose of this study. The extracted data were entered and analyzed in SPSS statistical package. The costs per inpatient day, per inpatient stay and outpatient visits were estimated by using the service and unit cost approaches.

The hospital costs of 453 patients (293 HIV positive, 160 HIV negative) were analyzed the mean length of stay of HIV/AIDS patients were 19 days and outpatient visits were 4 days. The HIV/AIDS patient service charges paid to the hospital (service cost) per admission were on average Birr 1,134 (US $ 132) and per outpatient visits were Birr 585.41 (US $ 68) moreover these inpatient and outpatient public services valued using private hospitals service prices the cost was Birr 4,614 (US $ 539) and Birr 1,072 (US $ 125) respectively. Whereas the unit cost of HIV/AIDS patients per admission were Birr 2,727.51(US $ 318) and Birr 629.88 (US $ 74) per outpatient visits.*

There was no significance difference in cost of treatment, average length of stay and outpatient visits between HIV positive and negative patients. However at the outpatient level the unit cost of treating the HIV/AIDS patients is significantly greater than the non-HIV/AIDS patients.

The similar cost patterns of the two patient groups examined in this study may reflect the fact that few therapeutic options, limited and non-specific basic health services are being provided to both groups of patients. Therefore information on costs of the treatment and care of AIDS patients in health facilities is necessary in order to have an idea of the likely costs of the increasing number of AIDS patients and to plan for their management and treatment effectively.

* 1 US $ = 8.56 Birr

CHAPTER ONE

INTRODUCTION

1.1 Background

Worldwide HIV/AIDS has created an enormous challenge on the survival of mankind. Since its recognition, the virus has infected close to 65 million individuals and over 25 million have already died due to AIDS (WHO, 2002).

According to the estimates issued by the Joint United Nations Program on AIDS, in all over the world around 42 million people are currently living with HIV/AIDS and 3.1 million people died from the disease which has nowadays become the fourth largest cause of death at the global level (UNAIDS, 2002). More than 70% of the world population, which is currently, infected lives in sub-Sahara Africa, where around 8% of the adult population have HIV/AIDS (Gaffeo, 2003). The region is now home to 29.4 million people living with HIV/AIDS. Approximately 3.5 million new infections occurred there in 2002, while the epidemic claimed the lives of an estimated 2.4 million people in the past year. Ten million young people (aged 15-24) and almost 3 million children under the age of 15 are living with HIV (UNAIDS, 2002).

In Ethiopia, the first documented case of HIV infection occurred in 1984 at Yekatit 12 hospital in Addis Ababa (Edemariam, *et.al,* 1988). The first AIDS case was also reported in 1986 in Addis Ababa (Hailu, *et.al,* 1990). Nevertheless it is believed that HIV started to spread in the country in early 1980s.

The growth of the epidemic in Ethiopia has been and continues to be rapid. For instance, adult HIV prevalence was estimated to be 2.7 % in 1989, 6.2 % in 1993, 7.1 % 1997, 7.3 % in 2000 the figure has increased to 7.6 % today (MOH, 2002b). Furthermore adult prevalence in urban Ethiopia as of 2002 was established to be much higher, 13.7 % than in rural areas where adult prevalence was estimated to be about 3.7 % (MOH, 2002b).

It is estimated that about 2.2 million people in Ethiopia are infected with HIV/AIDS, including 2million adults and 200,000 children (MOH, 2002b). Though Ethiopia constitutes only 1% of the world's population, it contributes about 9% of the world's HIV/AIDS cases. The estimated percent of adults aged 15 to 49 infected with HIV is 10.6%, making Ethiopia sixteenth in HIV prevalence, third highest in Africa and the third largest number of people living with HIV/AIDS in the world (UNAIDS, 2000).

AIDS affects health care sector through both supply and demand-sides. As more and more people infected with HIV develop opportunistic illness, this increases the demand for medical care and heavily taxing the over stretched public health services of many developing countries. In the mid 1990s, it was estimated that treatment for people with HIV consumed 66% of public health spending in Rwanda and over a quarter of health expenditure in Zimbabwe (UNAIDS, 2000).

Several case studies have been undertaken to estimate the direct treatment costs per case of HIV/AIDS in African countries, an important implication of estimates of direct costs of HIV/AIDS is that most figures are approaching to and even some are above an average per capita income of most African countries. A recent study estimated that in 1997 public health spending for AIDS alone already exceeded 2% of a Gross Domestic Product (GDP) in 7 of

16 African countries sampled, a staggering figure in countries where total health spending accounts for 3-5% of GDP (UNAIDS, 2000).

Further more a study by the World Bank indicated that the average cost in sub Saharan Africa to provide basic care to reduce suffering and to treat the less expensive opportunistic infections is about US $ 300 per patient year and if all opportunistic infections are treated the annual cost raises to US $ 500 (World Bank, 1997).

In recent years, HIV positive patients have occupied half of the beds in the provincial hospital in Chiang Mai, Thailand; 39% of the beds in Kenyatta National hospital in Nairobi, Kenya, and 70% of the beds in the Prince Regent hospital in Bujumbura, Burundi (UNAIDS, 2000). A related impact of the epidemic is that patients suffering from other conditions are being crowded out. The mortality in Kenya hospitals increased among HIV-negative patients, who are admitted at later stages of illness (UNAIDS, 2000).

Similarly in Cote d'Ivoire, Zambia, and Zimbabwe, HIV-infected patients occupy 50 to 80 % of all beds in urban hospitals; the services provided meet only a fraction of the needs (World Bank, 1997). Yet spending on AIDS care is crowding out, spending on other life-saving cost-effective programs. On average, treating an AIDS patient for one year is about as expensive as educating 10 primary school students for one year (World Bank, 1997).

In Ethiopia the direct and indirect cost of medical and preventive services and lost earnings due to HIV/AIDS have been studied and reported by Abdulhamid in 1998, the cost of hospital care for an AIDS patient ranged from Birr 425 to Birr 3140 (average of Birr 1800) during the

course of the illness. The total cost of caring for AIDS patients, according to government estimates was about 87 million Birr in 2000 expected to rise to 185 million by the year 2014 (Abdulhamid, 1998a), which would have a significant share from the health sector budget. Furthermore 42 % of all the country's hospital beds are occupied by AIDS patients and this expected to rise 54 % by the year 2004 leaving only 46% of the beds for all other afflictions in the country (Berhanu, 2001).

Clearly, these would place a tremendous burden on the public health system to provide adequate care for AIDS patients and there is a fear that because hospitals may have to use so much of their resources on HIV/AIDS patients, service available to other patients will deteriorate.

Although the health status of Ethiopians, without the complications of AIDS, is very low as indicated by all health status indicators. In Ethiopia the effect of HIV/AIDS on the health care service system, which is inadequate to handle the traditional health problems, could not be negligible. Medical services are experiencing growing demand because of AIDS, and hospital services are increasingly strained owing, to escalating case–loads and continued budget reduction.

This shows the treatment of HIV/AIDS patients may probably create greater demand on the scarce health care resources than non-HIV/AIDS patients. Therefore the main purpose of the present study is to provide information on the relative costs of managing the HIV/AIDS patients. This may help policy makers to allocate limited health care resources cost-effectively.

1.2 Statement of the problem

The direct economic impact of HIV can be observed due to a reduction in labor force as a result of AIDS. Apart from such labor force reduction, the medication cost and the related opportunity costs and switching of expenditure to meet a higher medication cost also entail another adverse impact to the economy.

HIV/AIDS weakens people's immune systems it makes them far more vulnerable to several opportunistic infections that have to be treated. This is clearly an additional burden on the health care service system at a time when the nation has not been able to address its major and long-standing health problems. Such as communicable diseases, acute respiratory infections followed by malaria, nutritional disorders, diarrhea and sexual transmitted diseases (MOH, 2000a). AIDS is superimposed on the existing health problems and complicates them.

The impact of HIV/AIDS epidemic on the health care sector will be severe since it will be faced with steeply increasing demand for care. This challenge to the health institution is driven by at least three factors of care namely medical care for opportunistic infections and HIV related disease. Psychological care for counseling for HIV-positive cases and HIV infection control in the institution through universal precaution measures. These all adding to the pressure on the public health services are the diminishing resources allocated to health care.

In this situation of dwindling resources and increasing demand, up to date information on costs of the treatment and care of HIV/AIDS patients in health facilities is necessary in order to have an idea of the increasing number of AIDS patients and to guide the allocation of the budget (resources) in the hospitals for HIV/AIDS patients towards maximum benefit in health gain and

used to encourage decision makers to plan and implement alternative cost effective programs and services for HIV/AIDS patients.

1.3 Objectives of the study

General Objective

- To determine the costs of hospital care for HIV/AIDS patients and non-HIV/AIDS patients.
- To estimate the costs of HIV/AIDS to hospitals.
- To investigate the implication of HIV/AIDS to hospital budget and finance in Addis Ababa.

Specific Objectives

To compare the treatment costs of HIV/AIDS and non-HIV/AIDS patient groups. With respect to:

- The cost per inpatient day.
- The average length of stay and outpatient visits.
- The total average costs of the inpatient stay and outpatient visits in the three public hospitals.

1.4 Significance and Rationale of the study

Ethiopia is one of the low-income countries with per-capita GNP only US $ 92.1(NBE, 2004). The share of the health sector from the National budget was 3.32% and per-capita health expenditure was 8.9 Birr. The Ethiopian health sector is confronting a crisis due to the present low economic status of the country in the face of increasing demand (rapid growth of population). Not more than half of the population has potential health service coverage.

There is shortage of trained health manpower resources. Physician per population 1:28,339 (compared to WHO standard 1: 10,000) and nurse per population 1:5,236(compared to WHO standard 1: 5,000) ratios are much lower than the WHO's standard (MOH, 2001). Appropriate utilization of scarce resources is one of the methods of controlling health care crisis. There fore the prime purpose of cost analysis is to guide the allocation of these scarce resources in the health sector towards maximum benefit in health gain. Hospital cost studies have been used to encourage decision makers to plan and implement alternative cost effective programs and services.

The treatment of HIV/AIDS patients may probably create greater demand on the scarce health care resources than non-HIV/AIDS patients. Medical resources in Ethiopia are quite meager. As a result the cost of medical services should seriously be taken in to account before any change in the health service delivery is made. The present study is aimed at providing information on the relative costs of managing the HIV/AIDS patients. If one leaves out the psychological effects, which are important but not easily measured, the income loss that the disease could bring has to be estimated to enable policy makers take more informed short-term and long term decisions when allocation resources and putting

priorities on different activities. Except a few studies that are mentioned, there have not been other studies that have looked at this issue in Ethiopia and no study in the country has put special emphasis on estimating the hospital costs of HIV/AIDS versus non-HIV/AIDS patients. Therefore, this study is an attempt to fill the gap.

This thesis has six parts. Part one deal with background of the study, Statement of the problem, objectives of the study and significance and rational of the study. Part two (literature review) describes the health service in Ethiopia and the epidemiology of HIV/AIDS. Part three deals with background about the study area, hypothesis and methodology. Part four depicts the results of the study. Part five deals with discussion and analysis of the major findings. Part six presents conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Health Service in Ethiopia

Development of any kind requires healthy people to provide the required labour. Development cannot move forward with a debilitated population that consumes resources without production. Therefore maintaining a healthy population is an important goal in its own right and is crucial to the development of productive workforce, which in turn, is essential for economic development.

Relative to other developing countries, including those in sub-Saharan Africa, Ethiopians have extremely poor health status (largely attributable to potentially preventable infectious diseases and nutritional deficiencies) and a high rate of population growth. Widespread poverty along with general low income levels of the vast majority of the population, low education levels, inadequate access to clean water and sanitation facilities and poor access to health services have also contributed to the burden of ill health. Causes of disease are mostly related to the poor condition of living of the people (MOH, 2000a; MOH, 2001).

The early history of modern medicine in Ethiopia started in the reign of Emperor Libne Dingel (1508-1540) (Pankhurst, 1965). It remained as a privilege to the members of the royal courts until the establishment of the first hospital in Addis Ababa in 1900 (Challi, *et.al*, 2003). Later Emperor, Haile Selassie facilitated the introduction and development of health services (Workneh and Kloos, 1993).

The first health legislation-introduced in 1947 which guaranteed the establishment of Ministry of Health (MOH) in 1948 (Challi, *et.al*, 2003). This is on landmark indicating the beginning of organized national health services. In 1960, Ethiopian Government begun to develop basic health services with health center as its backbone. (Workneh and Kloos, 1993).

The last (fourth) five-year development plan 1974-1979 emphasized the importance of public health services and set target to raise the health services coverage from 15 to 30% at the end of the plan period. The plan however, did not materialize due to social upheaval and change of government in 1974 (Challi, *et.al*, 2003).

The declaration of National Democratic Revolutionary Programme and adoption of the 1978 Alma-Ata declaration of Health for All by the year 2000, the Socialist Ethiopian government revised the existing health policy to give more emphasis on primary health care and rural health services, prevention and control of communicable diseases, self-reliance and community participation in health activities (Solomon, 1991). Since the government primarily pre occupied and was engaged all its effort toward the political conflicts and war, most of the health objectives and plan remained unattained.

After the downfall of the Dergue, the Transitional Government issued new health policy in 1993. The policy proposes goals and strategies based on the fundamental principles that health, which constitutes physical, mental and social wellbeing, is essential to the enjoyment of life and for the desired level of productivity (GFDRE, 1996).

The policy also stated that all segments of the population would be provided with essential preventive, promotive and curative services. It emphasizes, among other things, the control of communicable diseases, and diseases related to malnutrition and poor living condition (Challi, *et.al* 2003).

To translate the new health policy in to action, HSDP was developed which is a sector-wide approach to develop the health care. It is believed to enhance the benefits accrued from the limited resources by avoiding sources of inefficiencies and un-necessary duplication of efforts (Challi, *et.al,* 2003).

According to the present health care strategy, the health delivery system are arranged in a 4-tier referral system with PHCUs (a health center + 5 satellite health posts) constitute the first level and would serve 25,000 people. District, regional and specialized hospitals are the second to the fourth referral levels respectively (MOH, 2002b).

Although the number of health service institutions has increased with new policy of decentralization, the health status of the population still remains one of the lowest in the world. The following vital indicators witness the situation. The Crude Death Rate (CDR) is estimated to be 12.6 per 1,000 populations, with a Life Expectancy at Birth (LEB) of 53.4 for males and 55.5 for females, estimated Infant Mortality Rate (IMR) of 112.9 per 1,000 live births (NBE, 2004) and Maternal Mortality Rate (MMR) of 871 per 1,000 live births (CSA, 2001). And access to safe water only 28.4% (MOH, 2001).

The overall health service coverage is estimated to be approximately 51.8 % (MOH, 2001). The proportion of pregnant women immunized for tetanus is estimated at about 29.3 %, while about 56.3 % of children in Nov.2001 are estimated to have received DPT3 immunization. Antenatal coverage is approximately 30 % while the proportion of births attended by trained health personnel is estimated at 10 %. Postnatal visits and family planning services are 3.5 % and 9.8 % respectively. The major reasons for such poor coverage of health services in Ethiopia are the limited physical access of the population to health facilities and services. For instance in 2001, the hospital and health center to population ratios were 115 to 67 million and 412 to 67 million respectively (MOH, 2001).

The inhibiting influence of distance and lack of communication is an important concern in distributing health facilities. Many people should walk several kilometers for outpatient services. For instance the National Study showed that about 40 % of rural households live more than 10 kilometers from the nearest health facility (CSA, 1999).

The quality of health service delivery also suffered from the shortage, poor distribution and inappropriate mix and training of its health staff and inadequate provision of drugs and medical supplies (MOH, 2000a). The distribution of the different categories of health workers is highly skewed in favor of urban and semi-urban regional settings. Although the distribution of health workers among urban and semi-urban versus rural regional settings greatly varies, it is reported that one-third of medical doctors and one-sixth of nurses work in Addis Ababa, where only 4% of the country's population lives (MOH, 1998 a). Therefore, to improve the quality and health service coverage the present acute mal-

distribution of the health facilities and professionals in the country should not be left to continue.

The health sector in Ethiopia is financed through a variety of sources. These include general government revenue, donor aid/external assistance and foreign loans, user fees (for services and drugs) and community contributions. These financial inputs of the health services can be grouped into two broad categories, namely, Recurrent and Capital Budget. Of the total 2001/02 health budget 47.8% and 52.2% were capital and Recurrent Budgets respectively and the per capita health expenditure was around US $ 1.38 which is significantly lower than the Sub- Saharan average (MOH, 2001).

2.2 Epidemiology of HIV/AIDS

The story of HIV /AIDS began in 1979/80 when physicians in the United States of America observed clusters of previously extremely rare diseases. These included a type of pneumonia carried by birds (**Pneumocystis carinii)** and a cancer, **Kaposi's sarcoma**. The phenomenon was first reported by the US Centre for Disease Control in Atlanta (Barnett and Whiteside, 2002). In 1980/81, they discovered that young gay men were mysteriously getting diseases most often seen when the immune system is damaged (Sowadsky, 1999). As a result the disease was called Gay-Related Immune Deficiency Syndrome (Barnett and Whiteside, 2002).

As time progressed, the syndrome was identified among intra venous drug users, and infants born to mothers who used drugs. It was then become apparent that this was not a

'gay' disease and was renamed: 'Acquired Immunodeficiency Syndrome', shortened to the acronym AIDS (Barnett and Whiteside, 2002).

In early 1980s, two strains of HIV were isolated, (HIV-1 and HIV-2). However reports are generally limited to HIV-1 which is the most common form of HIV and referred to simply as "HIV", while HIV-2 has no epidemiologic or natural history data and is less infectious and progress more slowly, and found primarily in West Africa, except few cases which have been documented in the United States (World bank, 1997).

Some attributed AIDS to God as punishment for sexual promiscuity and others blamed biological warfare experiments that related the virus to the global population either deliberately or accidentally. Still another line of thought is that polio vaccine, widely given in central Africa in the 1950s and 1960s using monkey serum, could have been contaminated with Simian Immunodeficiency Viruses (SIVs). These viruses could not be detected at the time but could have been rapidly passed on to thousands of human through vaccination (Jackson, 2002).

Debate around the origin of AIDS has sparked considerable interest and controversy since the beginning of the epidemic. The first cases of AIDS occurred in the USA in 1981, but they provide little information about the source of the disease.

The issue of the origin of HIV could go beyond one of purely academic interest as an understanding of where the virus originated and how it evolved could be crucial in developing a vaccine against HIV and more effective treatments in the future (Kanabus and Allen, 2003). Also, knowledge of how the AIDS epidemic emerged could be important in

both mapping the future course of the epidemic and developing effective education and prevention programme.

Human Immunodeficiency Virus /HIV/ is a retrovirus which once inside the blood stream fatally damages the immune system of the host thus those infected with HIV do not die because of the virus perse, but because their immune system fails to counteract opportunistic infections, which would not otherwise have been fatal. The status of AIDS patient is diagnosed precisely when the immune system of HIV-infected people stops working properly (Gaffeo, 2003).

The problems of the HIV/AIDS epidemic is particularly glaring in the developing world, especially in the sub-Saharan Africa, where the rate of new HIV infections is high and rising dramatically contrary to the already saturated and ailing social, health and other infrastructure aimed a limping natural economy. AIDS in sub-Saharan Africa is now a major killer disease toppling the long standing for runner malaria and it is a bottleneck to their development strategies (UNAIDS, 2000).

More than 20 million African children will become orphans because of the epidemic. Mainly because of mother-to-child transmission of the virus, child mortality rates are rising as well. In Zimbabwe, for instance, the deaths among children under the age of five are now 70%. Although the prevention efforts exerted by some governments, like those of Zambia, Senegal and especially Uganda, are starting to bear fruit, the high prevalence rates across the region mean that even exceptional success on the prevention front will only gradually reduce the human death toll (UNAIDS, 2001).

No curative remedies are currently known for HIV/AIDS, apart from some Highly Active Antiretroviral Therapies (HAARTs), which are aimed at prolonging the life of infected people and partially preventing mother-to-child transmission by infected pregnant women. Given the state of the art of bio-medical sciences, the only other workable way of successfully counteracting the epidemic is through prevention, i.e. by adopting safe behavior, such as protected sex, limiting the number of sexual partners, and using mono-dose needles and, whenever possible, blood auto-transfusion (Gaffeo, 2003).

Transmission Mechanisms of HIV/AIDS

Every region of the world has been reached by the contagion, although with varying activity. This is reflected in the fact that the main medium of transmission varies from place to place, with unsafe blood donation, needle-sharing among injecting drug users and homosexual relationships being the main modes of transmission in the Northern hemisphere i.e., North America, Western and Eastern Europe and Central Asia; while heterosexual transmission is prevalent in the South i.e., in Africa, South and South-East Asia, and Latin America (Gaffeo, 2003).

Fortunately, for mankind, HIV is not a robust virus and hardly gets transmitted unless through contaminated body fluids. Although traces of HIV have been found in saliva, sweat, and tears, it is generally accepted that the exchange of these body fluids is not an efficient mode of transmission (Jeffrey, 1996).

For a person to be infected, the virus has to enter the body in sufficient quantities and must pass through an entry point in the skin and /or mucous membranes into the bloodstream. The main modes of transmission, in order of importance, are: - unsafe sex, transmission

from infected mother to child, use of infected blood or blood products, intravenous drug use with contaminated needles, other modes of transmission involving blood; such as, bleeding wounds etc (MOH, 2000b).

The vast majority of HIV infections are the result of sexual transmission. It contributes about 70 to 80% of the global transmission of HIV infection (MOH, 2000b). The presence of sexually transmitted disease (STDs), particularly those involving ulcers or discharges, will greatly increase the chance of HIV infection. STD means that there is more chance of broken skin membranes allowing the virus to enter the body. Furthermore, the very same cells that the virus is seeking to infect will be concentrated at the site of the STD because these cells are fighting the infection (Barnett and Whiteside, 2002).

In Ethiopia the majority of infection is transmitted through heterosexual contact. The two most important risk factors involved in the spread of HIV infection are having sexual contact with different partners including commercial sex workers and having sexually transmitted diseases (MOH, 1998c).

The next most important cause of HIV infection is mother to child transmission (MTCT) and it contributes, to about 5-10% of the global HIV infections (MOH, 2000b). This could occur during pregnancy, at the time of delivery or postnatally through breast feeding (Barnett and Whiteside, 2002b).

Use of contaminated blood or blood products is the most effective way of transmitting the virus as it introduces the virus directly into the blood stream. However, the global

contribution to HIV transmission through infected blood transfusion or blood products ranges between 3-5 % (MOH, 2000b). In most countries including Ethiopia the risks of HIV/AIDS transmission through this route are now minimal, because of the technology available to screen donated blood. The risk of infection cannot, however be entirely eliminated because of the window period where the presence of antibodies are not detectable (MOH, 2000b).

Drug users who share needles are also at risk of infection. If the equipment or drugs are contaminated, then the virus will be introduced directly into the body and also, contaminated medical or other instruments can transmit the virus (Barnett and Whiteside, 2002).

Ethiopia is one of the most seriously HIV/AIDS affected countries in the world. As would be expected; HIV/AIDS is more widespread in urban rather than the rural areas. For instance, the urban and rural HIV prevalence rate was 13.7 % and 3.7 % respectively (MOH, 2002b).

The impact of HIV/AIDS in Ethiopia has been severe. In terms of life expectancy, for example, CSA estimated that the life expectancy would have reached 50 by 2000 had it not been AIDS, which reduced it to 42 years (CSA, 2002; MOH, 2000b). Ministry of Health further projected that by 2014 the life expectancy at birth would be reduced to 46.5 years from 56.4 years (in absence of the disease)(MOH, 2000b).

In terms of the impact of HIV/AIDS on population size and growth, if there was no AIDS epidemic, the population of Ethiopia would be expected to increase from 60 million to 92 million people by 2014, however with AIDS epidemic the total population would rather be only 85 million by 2014 (MOH, 2000b).

Similar study shows that Crude Death Rate increases in the presence of AIDS. In the absence of AIDS, crude death rate was expected to decline from 7.3 per 1000 in 1984 to 5.6 and 5.3 per 1,000 in the year 2000 and 2004 respectively. But due to AIDS it was expected to increase from 7.3 per 1000 in 1984 to 10.6 and 12.3 per 1,000 in 2000 and 2004 respectively (Ahmed and Fikre, 2001).

Socio-economic variables that influence the risk of getting or passing HIV

There are different factors, which directly or indirectly affect the risk and magnitude of the HIV/AIDS problem in a given society. Studies have outlined broad ranges of biological, behavioral and societal factors that play an important role in the dissemination and exacerbation of HIV infection.

Individual awareness behavior and practices: The vast majority of Ethiopians had high level of awareness about HIV/AIDS. This is confirmed by the preliminary results of the 2002 behavioral surveillance survey (BSS). The report shows that 98% of the population was aware of HIV/AIDS and almost all knew at least one prevention method and 60 % were able to identify three prevention methods and believed "Having multiple sexual partners" was a major means of transmission of HIV/AIDS (Getnet, *et.al* 2002). Similarly another

study showed that 80 % of HIV-positive persons and 70 % of their families mentioned, "being faithful" or "using condoms" as a means of HIV prevention (Melesse, 2001).

However, the recent BSS study showed that nearly two out of three young people out of school reported that they are sexually active and had sex with two or more partners and that a significant proportions of the respondents did not always use condoms with non-regular partners (Getnet, *et.al* 2002).

Socio-Cultural factors: In Ethiopia Cultural attitude and norms leave no place for women to negotiate and discuss openly about sex and the basis upon which her sexual relationship with males. Once married, women are usually expected to remain faithful to their husbands but are unable to compel fidelity in return (Melesse, 2001)

Alcohol and Drug use: Alcohol and Drugs have been found to be one of the risk factors for HIV infection. In the BSS report 47 % of the respondents reported that they have ever tried drugs (chat), and about two third of the respondents consumed chat at least weekly and drunk alcohol once a week and have had recent un protected sex with a non marital partner (Getnet, *et.al,* 2002).

Furthermore another study showed that "Some men are more sexually excited when drunk thus they may be tempted to touch, hold or sleep with any women who consents to their sexual advaces" (Gathenya and Asanga, 2004). Ethiopia is a country where recreational activities / facilities and resort areas are scarce. And even when they are available their

services are very expensive for most of the people. As a result, many are forced to drink alcohol and chew chat to entertain themselves during their leisure times.

Poverty: The issue of poverty is a real one in the battle against HIV/AIDS. There is growing evidence in the hardest hit countries of Africa that national wealth will be reduced; as a result of HIV/AIDS lower rate of economic growth and increased poverty threaten to form a vicious circle in which HIV/AIDS drives many families in to deepening poverty (West Africa, 2000). Ethiopia is still one of the poorest nations in the world. Poverty particularly female poverty is a major factor that drives women, young and old, into risky behavior, including commercial sex work and dependence on multiple partners.

Poverty contributes **to migration**, which is a major risk factor for HIV. A different association between poverty and the spread of HIV occurs when men have to leave their families for far away places in search of better job opportunities. These migrant workers, being deprived of their wives, have the tendency to engage in casual sex in the locations where they find work. Not only is the transmission rate amongst people working and living around these work places particularly high, there is also a very high risk of husbands returning home to their families and infecting them (ECA, 2000).

Sexually Transmitted Diseases: The number of reported cases of sexually transmitted diseases (STDS) is increasing in Ethiopia. Evidence is now accumulating that STDS enhance the risk of sexual transmission of HIV infected individual and susceptibility of un-infected sex partner to HIV. For example, studies among patients of STD clinics in Kazanches and Teklehaymanote health centers found that 30 and 40 % were, HIV infected

(MOH, 2000b). This is three times higher than the prevalence of infection among the general urban population. Therefore the spreading of STDS in Ethiopia is an indication of the increasing incidence of HIV/AIDS.

War: favors the spread of AIDS through movements of solders who rely on prostitutes to satisfy their sexual needs. Protracted war in Ethiopia has produced a number of problems, among others; an increase the prevalence of HIV/AID is one. According to the study by Yigermu, *et.a,l* (2002), the HIV prevalence of demobilized soldiers in Ethiopia was 6.6%.

The National Response to HIV/AIDS

It is now almost 20 years since the HIV AIDS epidemic started in Ethiopia. The national response to the epidemic was promptly initiated with the establishment of a taskforce for HIV/AIDS in 1985. Later in 1987, the National AIDS control program was established at the department level within the MOH. This body was responsible for directing and coordinating the implementation of the AIDS control programme, and its primary objective was to prevent the progression of HIV infection and reduce the mortality and morbidity rate in the general public as much as possible (Mathewos, 1991).

In collaboration with experts from Global Program for AIDS (GPA)/WHO and the Ministry of Health, short and medium term plans were developed in March and May of 1987 respectively. The first Medium Term Plan (MTP-1) focused on public awareness, establishment of laboratory services, and surveillance of HIV and training of health workers.

The Second Medium Term Plan (1992-1996), MTP-II, was designed in December 1991, based on experience gained from the implementation of MTP-I. The major emphasis in MTP-II was on interventions to stop the spread of HIV. It adopted a multi-sectoral approach to mobilize a wide effort against AIDS through decentralization of AIDS/STD prevention and control activities.

Dissemination of AIDS information was the major strategy identified to create awareness in the general public. To implement this, an operational division responsible for information and education within the Department of AIDS Control Program was established. The National AIDS control program was decentralized to the regional level in 1997, guided by a taskforce within the MOH. In 1998, Ethiopia launched the National Policy on HIV/AIDS, which is designed to guide the implementation of prevention, care and support and target vulnerable groups (GFDRE, 1998).

Moreover the Ministry of Health and Regional health bureaus drafted multi-sectoral strategic five years plan. The plan has been updated for the 2000–2004 period through the Strategic Framework for the National Response to HIV/AIDS. The overall goals of the policy and framework are to reduce HIV transmission; reduce associated morbidity and mortality; and reduce burdens on individuals, families, and society at large (MOH, 1999a, 1999b, 1999c).

The National AIDS Council Secretariat (NACS), established in April 2000, includes governmental and non governmental organizations (NGOs), and religious bodies The Council has seven standing committees and implements national policy through 10 general

strategies: information, education, and communication activities; STD prevention and control; HIV testing and screening; adoption of proper sterilization and disinfection procedures; HIV surveillance, notification, and reporting and provision of medical care and psychosocial support to those affected by HIV/AIDS.

NACS was transformed into HIV/AIDS prevention and control office (HAPCO) in 2002.HAPCO was established as an executive agency by proclamation and the regional HAPCOs were established by regional laws as legal.

HIV/AIDS Prevention and Control Office (HAPCO) was established to mobilize multi-sect oral and grassroots efforts in the fight against the HIV/AIDS epidemic. The office's major tasks call for reviewing and updating existing policies and guidelines to ensure consistency with new scientific insights and methods of dealing with the epidemic. Advocacy and coordination are also part of HAPCO's responsibilities. The composition of the HAPCO reflects the type of focus it should bring to the battle against AIDS, i.e., creation of a policy environment that would facilitate the involvement of relevant Government sectors and non-Governmental organizations, and civil society institutions (MOH, 2002b).

In addition to these measures, the Drug Administration and Control Authority (DACA) has already introduced Anti Retroviral Drugs (ARV) into the country and organized training programmes for physicians, pharmacists and laboratory technicians in management and stopping of the disease, as well as in monitoring the response to Anti-Retro-Viral therapy and possible side-effects (UNAIDS, 2002). And also The Behavioral Surveillance Survey

(BSS), a second-generation surveillance tool, was conducted in Ethiopia in June 2002 to complement the extensive sero-prevalence and HIV surveillance systems instituted nationally (Getnet, *et.al*, 2002).

Progress in addressing the HIV/AIDS epidemic in Ethiopia has definitely been made since the first cases were reported in the mid 80`s, but the result of the efforts to arrest the spread of the disease were limited. This was owing to poor community level involvement and lack of adequate intera-sectoral coordination and integration. Therefore, there is still much work ahead.

CHAPTER THREE

DESCRIPTION OF THE STUDY AREA, HYPOTHESIS AND METHODOLOGY

3.1 STUDY AREA

Addis Ababa was the capital of Ethiopia and the major urban center in the country. The population of Addis Ababa as of 2001 was 2.5 million, with a population growth rate of nearly 2.9 % per year. Much of the population growth in the city still stems from migration from the countryside and smaller peri urban areas. Unemployment is high and incomes are low. A recent report indicated that 60 % of households earn less than Birr 300 per month (AACAHB, 1999). Substandard housing conditions, high infant and maternal mortality rates, inadequate health services and poor sanitation also characterize the city. The presence of large numbers of commercial sex workers aggravates the spread of HIV and other sexually transmitted diseases (AACAHB, 1999).

In urban Ethiopia, where more than 50 percent of the health facilities of the country are located, the situation is much better than in the rest of the country; for example in 2000 the urban infant mortality was 97 per 1,000, while it was 115 in rural areas, and the under-five mortality rates were respectively 149 and 193 (CSA, 2001). However, even these urban rates are rather low compared to most cities in other developing countries. This could be exemplified by the low health status of the population of Addis Ababa, which has, in fact, most of the health facilities of the urban areas. Health services in this city are largely provided by the government and the private sector, both traditional and modern. The Federal

Government and Addis Ababa City Government jointly own and manage 55.5 % (i.e. 10) of the hospitals while the Addis Ababa City Government alone manages and owns 90 % of the health centers. On the other hand, three hospitals, and the large majority of clinics, pharmacies and drug shops (respectively 73 %, 91 % and 97%), are privately owned (Van der loop, 2002).

From the eight Public hospitals in Addis Ababa three were purposively selected for the costing analysis. Zewditu hospital from Addis Ababa City Administration Health Bureau, St. Paul's hospital which is under the Federal Ministry of Health and Tikur Anbessa hospital from Addis Ababa University. From each hospital only medical wards and medical outpatient departments were included for the study since HIV/AIDS patients would mainly be treated in these departments.

3.2 HYPOTHESIS

The cost of treating HIV/AIDS patients is more expensive than the cost of treating non-HIV/AIDS patients.

3.3 RESEARCH METHODOLOGY

3.3.1 Study Design

This is an institution based cross sectional retrospective study to determine the costs of treating HIV/AIDS and non-HIV/AIDS patients in the three public referral hospitals. In order to carry out the research, the first stage was preparation of the sampling frame. The identification code, sex, age, outpatient, inpatients and the result of the test (sero- status) of all medical outpatient department and medical ward patients who took the test (study

population) in a year time were found in the hospital laboratory registration book or from TB clinic in the case of Zewditu hospital and from voluntary concealing and testing (VCT) centers in the cases of Tikur Anbessa and St. Paul's hospitals. It is from these source lists of patients in the outpatient department and medical ward that samples were selected randomly. The study was conducted during the period of February 2004 to March 2004.

3.3.2 Study subjects

HIV tasted patients (HIV positive and negative) in medical outpatient departments and medical wards during the period of July 2002 to June 2003 were the study participants.

3.3.3 Sample size

To compare mean cost of treating HIV positive patients with that of HIV negative patients' independent samples from HIV/AIDS positive and HIV/AIDS negative groups were taken. Considering these groups as strata, stratified random sampling with proportional allocation was applied.

Since no such studies were made before (found) in Ethiopia, it was not possible to know, the type of the distribution of costs of treatment of patients in both categories and also the variance of these costs. The total sample size (n) required, is then estimated on the basis of a pilot survey conducted taking a sample of size 25, that result in a mean and standard deviation of Birr 860 and Birr 441.74 respectively.

The formula used was,

$n = 2(s)^2(Z_{\alpha}+Z_{\beta})^2 / (MDC)^2$

Where:

n =the sample size estimate.

s = sample standard deviation (obtained from the pilot survey).

Z_{α}= Z-coefficient for the false-change (Type I) error.

Z_{β} = Z-coefficient for the missed-change (Type II) error.

MDC = Minimum detectable change size.

The value of n was determined to be 453, under the following conditions;

Results from pilot survey:

Mean (x) = 860

Standard deviation (s) = 441.74

The acceptable False-change error rate (α) = 0.05 so the appropriate Z_{α} = 1.65(α value is doubled for one tailed test.)

The desired Power is 90% (0.90) so the Missed-change error rate (ß) = 0.10 and the appropriate Z_{β}, coefficient = 1.28.

The Minimum Detectable Change in cost (MDC) is: 10% of the mean, (.10) (860) = Birr 86

the sample size calculated as follows

$n = 2(s)^2 (Z_{\alpha}+Z_{\beta})\ 2 / (MDC)^2$

$n = 2(441.74)^2(1.65+1.28)^2 / (86)^2$

$= 453.0037$

$= \underline{\mathbf{453}}$

This sample was found to be 20% of the total population considered (2265). So, proportional allocation to each stratum was applied.

Therefore, to have a reasonable sample size that represents the total population under the study, 20 % of the total HIV screened (tasted) patient medical records or charts and documents (20 % from HIV positive and 20 % from HIV negative patient records) was considered in this survey.

3.3.4 Method of Data collection

The data concerning cost of HIV/AIDS and non-HIV/AIDS patients were collected through Patient and Administrative records review.

Patient Records Review

Instruments were developed to collect data on the type and amount of drugs, medication, and supplies used, investigations (x-ray and laboratory tastes), treatment procedures performed, and length of stays and outpatient visits of the patients. For these, three hospitals eight data collectors and two supervisors (total ten) were recruited to collect the data by reviewing the patient's charts or medical records and training were given, for two days on how to identify desired information from medical and Administrative records and to transcribe the obtained information on the check list. The principal investigator supervised the data collection process by comparing the checklist with records.

Administrative Records Review

Data on a full year's hospital capital and recurrent cost for July 2002- June 2003 were gathered from administrative section of the hospitals, from the Federal Ministry of Health and Addis Ababa city Administration Health Bureau. The total data collection period was one and half month. Information on the recurrent costs including salaries for the personnel working in the individual hospitals appears in the financial statements. Therefore, at each hospital, type and grade of all staff members were recorded and using the government salary scale the total salary bill could be calculated.

Data was collected using a checklist on the type, amount, cost and service year of the needed items. Information on the model and type of equipment and furniture by department was retrieved from the master assets register. While the prices of these items, found through various suppliers or from the hospitals documents. The capital cost estimate (comprising hospital building, equipment and vehicle) was based on each item's estimated replacement value. The equivalent annual costs were calculated assuming a useful life span of 20 years for buildings (as recommended in cost manuals such as (Creese and Parker 1994), 10 years for equipment and vehicles and 5 years for furniture.

3.4 APPROACHES OF TOTAL COST DETERMINATION

To determine the total cost of HIV positive and HIV negative patients both at the inpatient and outpatient level. Two approaches were used.

3.4.1 Service cost based

Service cost is the price that the patient pays for investigations, drugs, consultation and treatment etc. Consultation and beds costs (hotel costs) for inpatients and consultation cost for outpatients considered to include the labor (professional) cost involved.

A. Inpatient

i) Using low priced public service basis

Total cost inpatient episode TC = (B) - average bed days + total drug used (D_i) + treatment + consultation received (T_i) +investigation received (I_i)

$$TC = BP_1 + \sum_{i=1} D_i P_{2i} + T_i P_{3i} + I_i P_{4i}$$

P_1= price of bed per day low priced public hospital

P_{2i} = price of drug i

(i= 1, 2, ----n) (drug 1, drug 2, drug 3---drug n)

P_{3i}= price of treatment and consultation i

(i =1, 2, ---n) (Consultation fee, treatment 1, treatment 2, ---treatment n)

P_{4i}= price of investigation i

(i= 1, 2, ---n) (Chest x-ray, CT scan, ---stool exam, U/A etc. ---)

B. OUTPATIENT

i) Using low priced public service basis

Total cost out patient visits TC = total drug used (D_i) + treatment + consultation received (T_i) + investigation received (I_i)

$$TC = \sum_{i=1} D_i p_1 + T_i p_{2i} + I_i p_{3i}$$

P_1= price of drug i

(i= 1, 2, ----n) (drug 1, drug 2, drug 3---drug n)

P_{2i} = price of treatment and consultation i

($_i$ =1, 2, ---n) (Consultation fee, treatment 1, treatment 2, --- treatment n)

P_{3i} = price of investigation

(i= 1, 2, ---n) (Chest x-ray, CT scan, ---stool exam, U/A ---etc.)

Similarly, price of public high, and private low and private high prices sets were applied for both inpatient and outpatient.

Costs of Prevention and accidental exposure to HIV/AIDS: HIV may be transmitted in the health care settings from patients to patients from patient to health care worker or more rarely from health care workers to patients. Because of the presumed universally fatal outcome of HIV infection-continuing efforts must be made to avoid even rare instance of HIV transmission in health setting. Therefore prevention techniques and materials such as blood screening for transfusion, gloves and disposable syringes etc, should be available in

health settings. All these costs are included under the drug costs in this study. However blood screening for HIV before transfusion is done in the Red Cross blood bank, the cost was not included in hospital settings. And also the treatment cost of accidental exposure of health workers to HIV/AIDS was not included in this study because all of the three hospitals had no such system to provide ARV drug as a post exposure prophylaxis.

3.4.2 Unit cost based

It is important to understand HIV/AIDS care costs from a provider perspective by calculating resource utilization and unit costs, these results allow for estimation of actual cost for facilities and diseases.

The price that the patients are paying for investigation and treatment may not give actual cost estimate. Cost is the actual value of goods or service. In countries where cost is not totally recovered, price cannot give the true value. The price may be lower because it is subsidized. There fore the unit treatment cost of the patient is an alternative to determine the actual cost estimates.

Unit cost studies could help obtain understanding of where these costs are incurred. The appropriate and equity issues involved, the rational and efficient use and shortfall of existing resources and consequently measures required to improve the situation. They are also of interest to the clinical manager who decides on how critical human and material resources are used. They could also be important in determining the level of subsidy one is providing or is willing to provide (Abdulhamid, 1998b).

In most instances, the cost information collected (by Administration record review) was available only on an aggregate basis for the hospital as a whole and not by department. Since the objective of the study was to calculate the costs of an inpatient day and outpatient visit for an HIV/AIDS patient in medical outpatient departments and medical wards, it was necessary to identify from these aggregate data all resources used by both medical outpatient department and medical wards to provide their services.

The methodology used to estimate the average costs per inpatient day and outpatient visit was a combination of two different approaches: (1) standard step-down costing methodology, and (2) the bottom-up costing method. The latter was used to estimate the direct treatment, investigations and drug costs while the former captured the costs of the remaining resources used. These two methods are described below.

Step-down Costing Methodology

As described for (Hansen *et.al*, 2000), the ultimate purpose of applying the standard step-down costing methodology was to allocate all overhead costs of running a hospital to departments providing the final output of the hospital: in this case the cost share of medical wards and medical outpatient departments were considered.

Overhead costs are the sum of capital and recurrent costs. Capital costs are those that have life expectancy of more than one year and recurrent costs are those resources that are expected to be consumed or replaced within one year prorated on per case basis. Capital cost includes the cost of buildings, vehicles (bicycles, motorcycles, four wheel drive vehicles,

and trucks) and equipment (refrigerators, sterilizers, machines, scales and other equipments with unit cost (price) of $100 and more).

In recurrent cost salary of administrative and technical staff (personnel cost), vehicles operation and maintenance costs, building operation and maintenance costs, hotel cost, supplies with unit cost less than $100 and other running costs were included. Therefore, the overhead cost of an intervention is its share of the annual costs of the building, equipment, furniture and recurrent expenditure including personnel costs (excluding the costs of pharmaceuticals) of the hospitals. Average overhead cost was calculated by per bed day and per outpatient visit.

Step-down costing methodology, capture a portion of all overhead costs reflecting usage as well as costs of resources related directly to outpatient and an individual ward, such as the attached personnel. (Hansen,*et.al*, 2000)Therefore the cost of each outpatient visit and each inpatient day were calculated by dividing the cost share of medical outpatient departments by the number of medical OPD new equivalent visits and the cost share of medical ward by the number of medical total inpatient days respectively (Shapard *et.al*, 2000).

Steps for actual unit cost calculations

Overhead category (xi)

X_1= Total Furniture cost X_2 = Total Equipment cost,

X_3 =Total Building cost X_4 =Annual Recurrent cost

A. Inpatients

The assumption that the inpatient to outpatient cost ratio is **6:1**[1]

1. Total cost of X_i x 0.6

$$\text{Total cost } X_i = 0.6 \sum_{i=1} x_i$$

2. Annual cost of $X_i = Z_i = \frac{0.6X_1}{5} + \frac{0.6X_2}{10} + \frac{0.6X_3}{20} + 0.6X_4$

3. Share of medical ward of $Z_i = M_i$

$$M_i = Z_i \times \frac{\text{Medical inpatient days}}{\text{Total inpatient days}}$$

4. Share of each medical inpatient day $B_i = \frac{M_i}{\text{Medical inpatient days}}$.

Therefore B_i - is the cost per inpatient day.

Source: (Shepard *et.al,* 2000)

[1] This is based on estimates of floor area occupied by outpatient units and its proportion of personnel time devoted and outpatient service in those hospitals. This has been commented on by professionals working in the hospitals.

B. Outpatients

1. Total cost of X_i x 0.1

$$\text{Total cost } X_i = 0.1 \sum_{i=1} x_i$$

2. Annual cost of $X_i = Z_i = \frac{0.1X_1}{5} + \frac{0.1X_2}{10} + \frac{0.1X_3}{20} + 0.1X_4$

3. Share of Medical outpatient of Z_i =

2 repeat outpatients are considered equal to 1 new outpatient =New equivalent visit

$$M_i = Z_i \quad X \quad \frac{\text{New equivalent visits (Medical OPD)}}{\text{Total new outpatient equivalents}}$$

4. Share of each Medical outpatient visits =

$$O_i = \frac{M_i}{\text{New equivalent visits}}.$$

Therefore O_i = is the cost of each outpatient visit.

Source: (Shepard *et.al*, 2000)

Bottom-up Costing

The aim of the bottom-up costing methodology is to capture the direct treatment and investigation costs such as drugs and disposable medical supplies, medication, x-ray and laboratory tests.

To determine the **drug and pharmaceutical cost**, information on type and quality of drugs and disposable medical supplies were collected for each patient. Then the current prices of these items in public and private hospitals were considered for the estimation.

Unit investigation cost (I_p)

The input of investigations (x-ray, Laboratory) includes equipment, labour and others. The costs of labour and equipments have been taken care of under overhead costs. Thus, in investigation cost, these costs are excluded to avoid double counting and only the cost of the reagents and other materials used during investigation are included under this cost component (Tadele and Mohamed, 1996). Where as the service costs **of diagnostic investigation** (laboratory and x-ray tests) were estimated by using the current prices of tests, in both public and private hospitals.

The total unit costs of an inpatient day and outpatient visit were calculated by adding the costs found in the standard step-down costing methodology and the bottom-up costing methodology.

The unit cost approach used the total average overhead cost at the inpatient level (B_i) and the total average overhead cost at the outpatient level (O_i) and applied to cost of service received

directly for drugs consumed and investigation used (Ip) at the inpatient and outpatient respectively.

Therefore,

A. Inpatient total cost = (Alternative total cost calculations)

$$= \mathbf{B_i} + \mathbf{D_i P_{2i}} + \mathbf{I_p}$$

B. Out patient total cost = $\mathbf{O_i} + \mathbf{D_i P_{2i}} + \mathbf{I_p}$

Two price sets were employed: public low and public high.

Having divided the patients' notes into two groups by HIV status, a comparison between AIDS and non-AIDS patients were made for the costing analysis. Since these two groups were only distinguished by the HIV/AIDS status, each group contained the same presenting illnesses, for instance, TB or pneumonia.

3.5 Data analysis

Data were entered, cleared and analyzed using SPSS. Microsoft Excel was used for some mathematical calculations. Non-parametric WILCOXON-MANN-WHITNEY TEST (Stat Xact-4) was used to compare the mean rank costs, inpatient days and outpatient visits of HIV/AIDS positive and negative patients.

Ethical considerations

This study was first approved by the graduate committees of both the department of Regional and Local Development Studies (RLDS) and Faculty of Business and Economics (FBE) of Addis Ababa University. Then the graduate committees of the school of Graduate Studies of the university approved it. Written consent was obtained from Addis Ababa city Administration Health Bureau and the respective hospitals.

Limitations of the Study

- Length of stay may be affected by chronic diseases the patient have other than HIV/AIDS
- The cost does not include the costs incurred by the patient (e.g. transport, lodging, food and Waiting time costs etc.) and the family who are handling the patient during hospital visits.
- Medical records could be incomplete or missing.

Strength

- Easy access to compiled information.
- It is based on actual medical expenses.
- In addition to the costs of HIV/AIDS to the health care system this study has come up with the finding of cost of HIV/AIDS to individual patient.

CHAPTER FOUR

RESULT OF THE STUDY

The result of this study is presented in four sections. The first section describes the characteristics of the study patients with regard to their HIV status, sex composition, age category, marital status, occupation and place of residence. It also describes the comparative analysis result of HIV positive and negative patients in relation to incidence of most common diseases, average length of inpatient stay and outpatient visits. The second section presents the percentage of HIV positive patients from the total medical ward admission and medical outpatients in each hospital. It also shows the three hospital medical wards bed occupancy by HIV positive patients. The third section of the results includes comparative quantitative analysis of the service and unit cost estimations between HIV positive and negative patients in both inpatient and outpatient level. The fourth section shows the percentage share of HIV positive patients from the total hospitals budget.

4.1. Characteristics of the study patients

Out of the total 453 patients in the sample, 293 (65 %) were HIV positive while the rest, 160 (35%) were HIV negative. Of the 293 HIV positive patients, 55 % were males and the rest were females. A slightly higher HIV infection rate was found in males than in females.

Table 1. HIV status by sex

Sex	HIV positive	%	HIV Negative	%	**Total**
Male	162	55	81	51	243
Female	131	45	79	49	210
Total	293	65	160	35	**453**

As shown in Table 2 below, the highest HIV prevalence rate was observed in age group 24 to 56.

Table 2. HIV status by age categories

Age	HIV positive	%	HIV Negative	%
13--23	21	7.2	36	22.8
24--34	115	39.5	54	34.2
35--45	86	29.6	34	21.5
46--56	53	18.2	22	13.9
57--67	11	3.8	8	5.1
>67	7	1.5	6	2.5

From the total HIV positive patients, 225(85.8%) were residents of Addis Ababa and the rest 39 (14.2%) were from outside the capital (see Table 3).

Table 3. HIV status by place of Residence

Place of Residence	HIV positive	%	HIV Negative	%	Total
Addis Ababa	225	85.8	103	74.8	328
Out of Addis Ababa	39	14.2	36	25.2	75
Total	264	65.5	139	34.4	**403**

Concerning marital status, as indicated in Table 4, 57.7 % of HIV positive patients were married, 26.2 % single, 8.2 % divorced and 7.7 % widowed.

Table 4. HIV status by marital status

Marital Status	HIV positive	%	HIV Negative	%	Total
Married	112	57.7	58	52.2	170
Single	51	26.2	46	41.4	97
Divorced	16	8.2	4	3.6	20
Widowed	15	7.7	3	2.7	18
Total	194	63.6	111	36.4	**305**

Table 5 shows that, 26.3 % of HIV positive patients were housewives, 22.8 % civil servants, 14.6 % drivers and 13.4 % daily laborers.

Table 5. HIV status by Occupation

Occupation	HIV positive	%	HIV Negative	%	Total
Civil servant	45	26.3	24	30.3	69
Housewife	39	22.8	2	2.5	41
Daily laborers	23	13.4	11	13.9	35
Student	11	6.4	17	21.5	28
Driver	25	14.6	2	2.5	26
Unemployed	11	6.4	6	7.5	17
Merchant	13	7.6	0		13
NGO	4	2.3	2	2.5	4
TOTAL	**171**	**68.4**	**79**	**31.6**	**250**

Table 6 shows, the most prevalent diseases disaggregated by HIV status of patients. Tuberculosis, toxoplasmosis and Pneumocytis carinii pneumonia (PCP) were diagnosed respectively in 38.7 %, 10 % and 7 % of HIV positive patients. These diseases were found to be more prevalent in the HIV positive group than in the HIV negatives. However, peptic ulcer diseases (4.6 %), acute febrile illness (3.9 %) and stroke sepsis (3.3 %) were more common in the HIV negative than in the HIV positive group.

Table 6. Common diseases diagnosed in HIV Positive and Negative patients.

	HIV positive	%	HIV negative	%
Tuberculosis (TB)	111	38.7	37	24.2
Toxoplasmosis	29	10	5	3.3
Pneumocytis carinii pneumonia	20	7	3	2.0
Pneumonia	9	3.1	5	3.3
Chronic diarrhea	7	2.4	4	2.6
Oral candidis	6	2	2	1.3
Peptic ulcer disease	5	1.7	7	4.6
Stroke sepsis	3	1.0	5	3.3
Acute febrile illness	1	0.3	6	3.9
Hepatoma	-	0.0	3	2.0
Others		35.7		50.8

During observation in the three hospitals, relatively continuous follow up has been given for HIV/AIDS patients in Zewditu hospital. There was no high patient pressure, which would likely limit HIV/AIDS patient staying in the hospital. Mostly the patients discharged when they improved or if they were critically ill and hopeless. The average inpatient stay of HIV/AIDS patients in Zewditu hospital (23 days) was slightly greater than HIV negative patients (21 days). But the reverse was true in Tikur Anbessa and St. Paul's hospitals were the average inpatient stay of HIV positive patients was found to be less than that of HIV negative patients. Except in Tikur Anbessa hospital, the average outpatient visit of HIV positive patients was greater than the average outpatient visit of HIV negative patients (see Table 7). The total average inpatient days for HIV positive patients was 19 days, and for that of the HIV negative group was 20 days. The total average outpatient visits for HIV positive patients were 4 days one day longer than the HIV negative group (see Table 7). However, the difference was not statistically significant ($p > 0.05$) (see Appendix 6).

Table 7. Estimated average inpatient stays and outpatient visits of both HIV Positive and HIV Negative patients in the three public hospitals.

Name of health institution	Average inpatient Stays		Average outpatient Visits	
	HIV Positive	HIV Negative	HIV Positive	HIV Negative
Tikur Anbessa Hospital	19	21	4.55	5.53
St. Paul's Hospital	15	16	4.25	2.55
Zewditu Hospital	23	21	4.29	2.43
Total average	**19**	**20**	**4.35**	**3.29**

4.2. Proportion of HIV positive patients in medical wards and medical outpatient departments.

Table 8 shows that out of the total number of patients admitted to Tikur Anbessa and St. Paul's hospitals, HIV positive patients constituted 14 % and 18 % respectively. Zewditu hospital admitted a greater number of HIV positive patients, 49 % from the total inpatients (a figure which is three times more than that of the two hospitals). Out of the total medical new outpatient, HIV positive patients constituted 1 %, 2 % and 3 % in Tikur Anbessa hospital, Zewditu hospital and St Paul's hospitals respectively.

Table 8. Proportion of HIV positive patients in medical wards and medical outpatient departments from July 2002—June 2003.

	Medical ward			**Medical outpatient**		
Name of health institution	Total no of patients	Total no of HIV Positive patients	Proportion of HIV positive patients in %	Total no of new Patients	Total no Of HIV Positive Patients	Proportion of HIV Positive Patients in %
Tikur Anbessa Hospital	2066	290	14	18622	155	1
Zewditu Hospital	696	340	49	6615	100	2
St. Paul's Hospital	1301	240	18	11339	340	3

Table 9. Medical wards bed occupancy by HIV positive patients.

Name of health institution	Inpatient days	No of Beds	Bed occupied by HIV infected %
Tikur Anbessa Hospital	5375	123	**12**
St. Paul's Hospital	3380	77	**12**
Zewditu Hospital	7765	40	**53**

As depicted in Table 9 the percentage of beds occupied on average by HIV/AIDS patients in Tikur Anbessa and st Paul's hospitals were 12% and 53% in Zewditu hospital, leaving only 47% of the beds for all other afflictions in the hospital. Therefore, there is a lot concern that patients with HIV are displacing non-HIV infected patients.

4.3. Cost Estimations

4.3.1. Service Cost Estimation

As indicated in Table 10 below, the mean drug cost for HIV positive patients in public hospitals ranges from Birr 405.95 to Birr 457.92 and the same service in a private hospital could cost from Birr 439.77 to Birr 891.91. When the drug costs in HIV positive and negative patients are compared, HIV positive patients spent more money on drugs than HIV negative patients. The drug expenses of HIV/AIDS patients were higher than HIV/AIDS negative patients and the difference was statistically significant ($p < 0.05$) (see Appendix 6). In contrast to this, investigation cost was more for non-HIV/AIDS patients than HIV/AIDS patients (see Table 11).

Table 10. Mean Cost of Drugs: HIV positives compared to HIV negatives.

Total drug cost	HIV Positive	HIV Negative
Lower public	405.95	308.17
Upper public	457.92	390.83
Lower private	439.77	368.91
Upper private	891.91	857.42

Table 11 shows; the investigation cost for non-HIV/AIDS patients is slightly higher than the costs of getting investigation by HIV/AIDS patients. However, there is no statistical difference in costs between the two groups ($p > 0.05$).

Table 11. Investigation cost by HIV status

Total Investigation Cost	HIV Positive Mean	HIV Negative Mean
Lower public	115.91	140.72
Upper public	150.35	183.73
Lower private	248.12	282.76
Upper private	322.75	354.66

The inpatient service cost of HIV/AIDS patients in St. Paul's, Zewditu and Tikur Anbessa hospitals were Birr 832.02, Birr 1,140.02 and Birr 1,192.60 respectively (see Table 12). When we compare the cost in this Table, except the service cost of Zewditu hospital where the service cost of HIV positive inpatients was slightly greater than the service cost for HIV negative groups, in the remaining two hospitals, the reverse was true where the service cost of HIV negative inpatients was found to be slightly greater than the service cost for HIV positive groups.

Table 12. Mean Inpatient Service Cost by Hospitals

	St. Paul's Hospital		Zewditu Hospital		Tikur Anbessa Hospital	
	HIV Positive	HIV Negative	HIV Positive	HIV Negative	HIV Positive	HIV Negative
Cost of drug per episode of hospitalization	500.23	530.92	625.37	447.58	600.90	472.42
Investigation cost per episode	83.52	83.13	123.66	124.18	268.23	319.58
Cost of bed per episode	236.60	273.08	367.69	336.59	298.40	414.77
Cost of consultation per episode	4.67	15.31	23.30	57.07	25.13	29.73
Total cost per episode	**832.02**	**902.44**	**1,140.02**	**965.42**	**1,192.60**	**1,236.50**

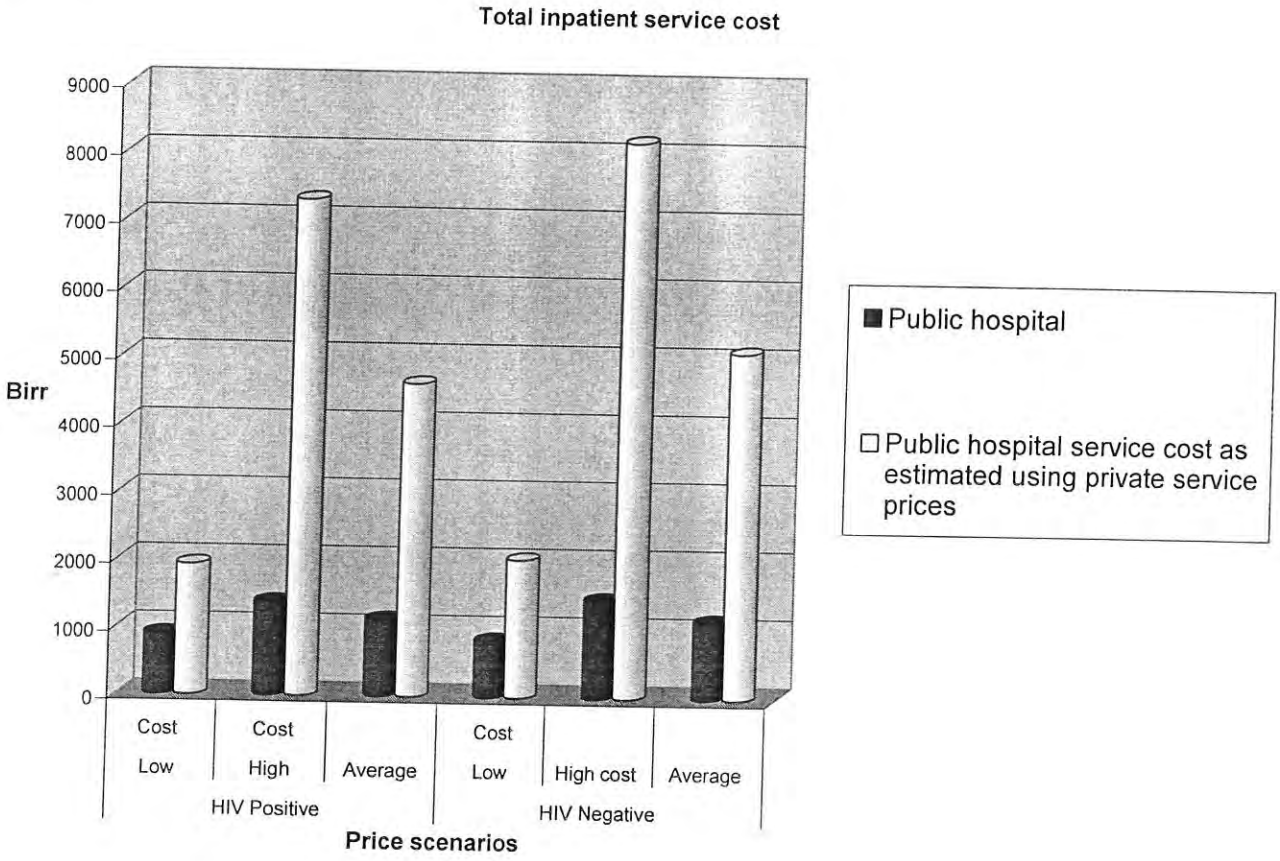
Table 13, shows total inpatient service costs (cost of drugs, investigation cost, cost of bed and consultation cost per episode of illness). The average treatment cost of HIV positive inpatients was Birr 892.84 in low cost and Birr 1,376.09 in high cost scenarios; while the non-HIV/AIDS patients treatment in low and high cost scenarios were Birr 841.97 and Birr 1,448.73 respectively. Therefore, the total average treatment cost per HIV/AIDS inpatient

stay in the public hospital was Birr 1,134. The average cost per HIV negative inpatient stay was around Birr 1,145. Furthermore the service cost per inpatient day for HIV/AIDS and non-HIV/AIDS patients were Birr 60 and Birr 57 respectively. There was no statistically significant service cost differences between HIV positive and negative inpatients ($P > 0.05$) in both scenarios (see Appendix 6).

Table 13. Total inpatient service cost: low and high cost scenarios

	HIV Positive			HIV Negative		
	Low Cost	High Cost	Average	Low Cost	High cost	Average
Public hospital	892.84	1,376.09	**1,134**	841.97	1,448.73	**1,145**
Public hospital service cost as estimated using private service prices	1,920.92	7,306.39	**4,614**	2,032.35	8,190.76	**5,112**

Figure 1



As indicated in Table 14, the average outpatient service cost for HIV positive patient at St. Paul's hospital was Birr 226.08, in Zewditu hospital Birr 310.20 and in Tikur Anbessa hospital Birr 483.03 and the average outpatient service cost of HIV negative patients in St. Paul's hospital Birr 165.64, Zewditu hospital Birr 166.26 and in Tikur Anbessa hospital Birr 432.75. The outpatient service cost of HIV positive patients in all of the three hospitals were greater than that of the service cost of HIV negative groups.

Table 14. Mean Outpatient Service Cost by Hospitals

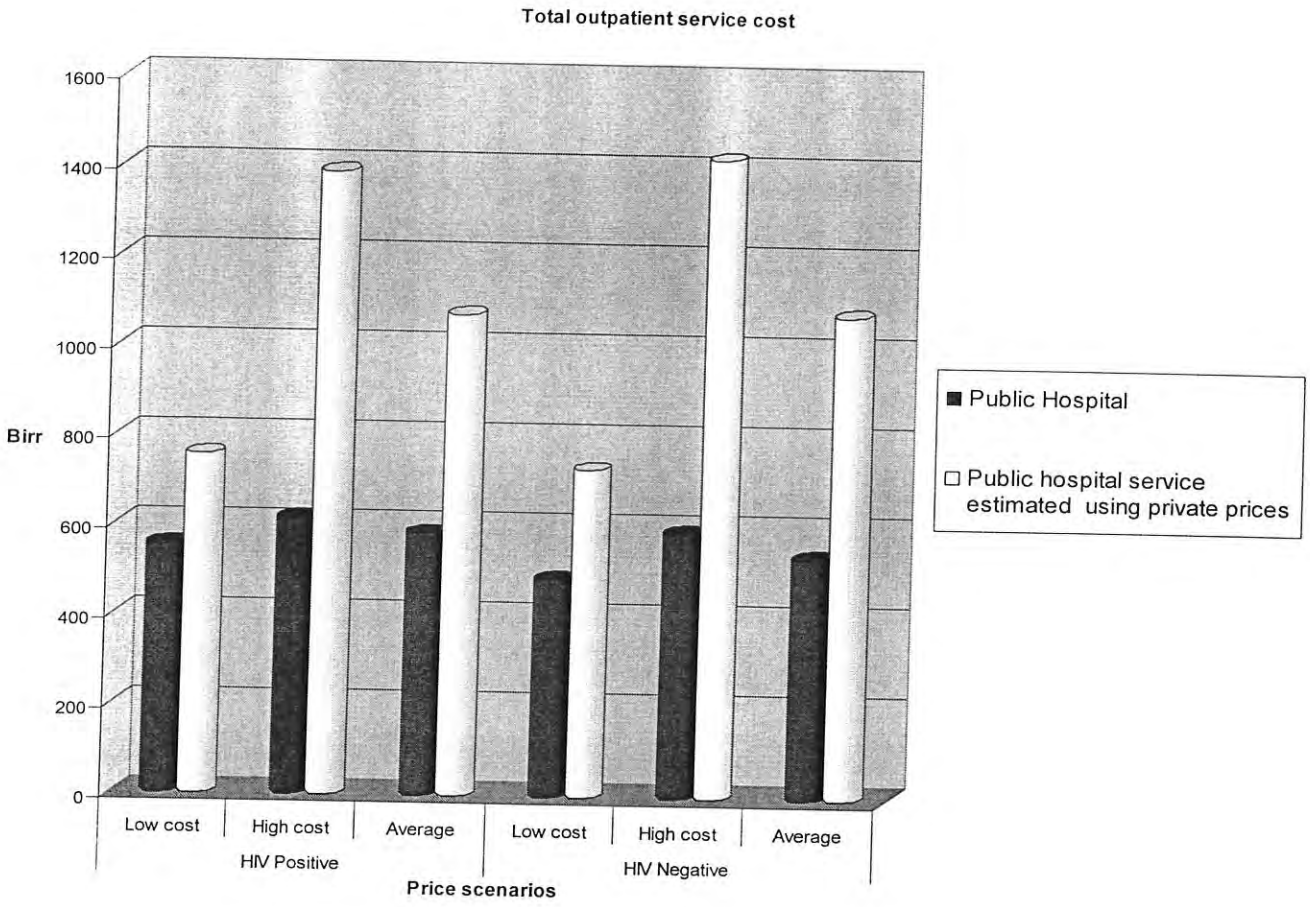
	St. Paul's Hospital		Zewditu Hospital		Tikur Anbessa Hospital	
	HIV Positive	HIV Negative	HIV Positive	HIV Negative	HIV Positive	HIV Negative
Drug cost	138.88	91.92	234.36	104.82	207.72	133.12
Investigation cost	58.51	56.54	46.86	45.02	245.01	262.28
Cost of consultation	28.69	17.18	28.98	16.42	30.30	37.35
Total average cost	**226.08**	**165.64**	**310.20**	**166.26**	**483.03**	**432.75**

The total outpatient service cost consists of cost of drugs; investigation cost and consultation cost per episode of illness in all of the three public hospitals (see Table 15). At the outpatient level, the mean service cost of HIV positive patients was Birr 585.41 and the mean service cost of HIV negative patients was around Birr 539.10. These shows the treatment cost of HIV positive patients was slightly greater than the treatment cost of HIV negatives however it is not statistically significant ($P > 0.05$) (see Appendix 6).

Table 15. Total Outpatient Service Cost: Low and High Cost Scenarios

	HIV Positive			HIV Negative		
	Low cost	High cost	Average	Low cost	High cost	Average
Public Hospital	554.46	616.26	585.41	487	591.21	539.10
Public hospital service estimated using private prices	755.95	1,388.09	1,072.02	730.15	1,424.34	1,077.24

Figure 2



4.3.2. Unit Cost Estimation

Table 16, describes the actual unit cost of HIV/AIDS and the non-HIV/AIDS patients from the provider perspective (hospitals). The total unit cost of HIV/AIDS inpatients stay in St. Paul's hospitals was Birr 2820.40, in Zewditu hospital Birr 2486.68 and in Tikur Anbessa hospital Birr 2816.63. Only in Zewditu hospital the unit cost of HIV positive inpatients was greater than the unit cost of HIV negative patients (Birr 2158.31). The reverse was true in Tikur Anbessa and St. Paul's hospitals.

Table 16. Inpatient Unit Cost by Hospitals: An Alternative

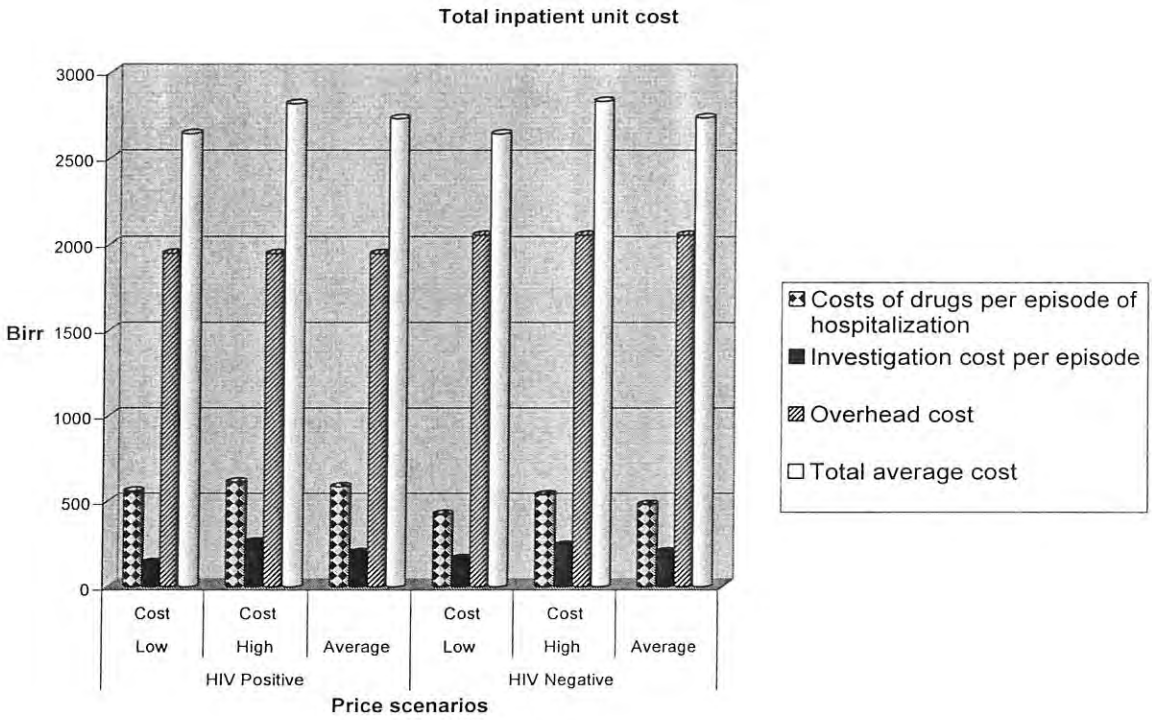
	St. Paul's Hospital		Zewditu Hospital		Tikur Anbessa Hospital	
	HIV Positive	HIV Negative	HIV Positive	HIV Negative	HIV Positive	HIV Negative
Cost of drugs per episode of Hospitalization	500.23	530.92	625.37	447.58	600.90	472.42
Investigation cost per episode	83.52	83.13	123.66	124.18	268.23	319.58
Overhead cost	2236.65	2534.87	1737.65	1586.55	1947.50	2152.50
Total cost per episode	2820.40	3148.92	2486.68	2158.31	2816.63	2944.50

As it is indicated in Table 17, the total unit cost of HIV positive inpatients in all of the three hospitals was Birr 2727.51 (which is two times more than the inpatient service cost) (see Table 13) and the total average unit cost for HIV negative groups was Birr 2733.54. Moreover the unit cost per inpatient day for HIV/AIDS and non-HIV/AIDS patients were Birr 143.55 and Birr 136.67 respectively.

Table 17. **Total inpatient unit cost: an Alternative**

	HIV Positive			HIV Negative		
	Low Cost	High Cost	Average	Low Cost	High Cost	Average
Costs of drugs per episode of hospitalization	555.59	609.96	582.77	421.64	535.25	478.44
Investigation cost per episode	138.85	260.13	199.49	164.64	241.20	202.92
Overhead cost	1945.25	1945.25	1945.25	2052.18	2052.18	2052.18
Total average cost	2639.69	2815.34	**2727. 51**	2638.46	2828.63	**2733. 54**

Figure 3.



The unit cost of HIV positive patients in each hospital was greater than the unit cost of HIV negative groups in the same hospitals (see Table 18).

Table 18. Outpatient Unit Cost by Hospitals: An Alternative

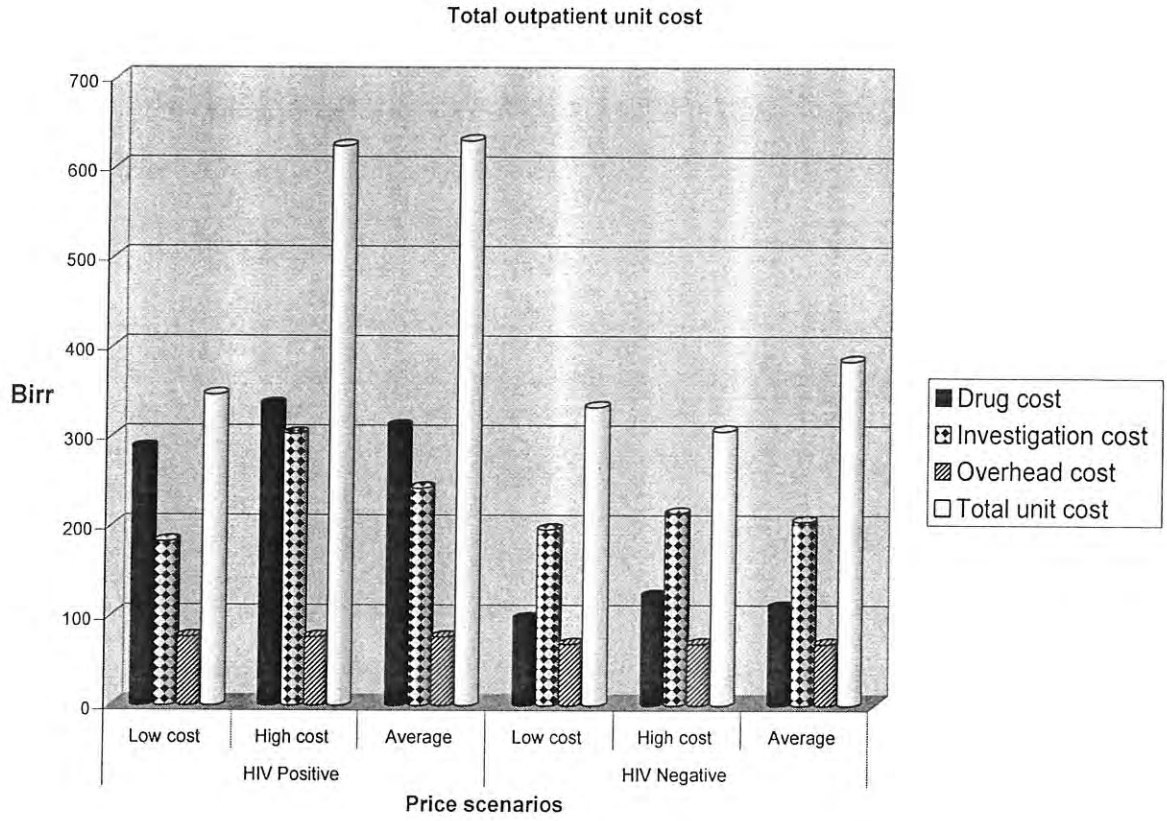
	St. Paul's Hospital		Zewditu Hospital		Tikur Anbessa Hospital	
	HIV Positive	HIV Negative	HIV Positive	HIV Negative	HIV Positive	HIV Negative
Drug cost	138 .88	91.92	234.36	104.82	207.72	133.12
Investigation cost	158.51	156.54	146.86	145.02	345	362
Overhead cost	84.53	50.71	46.37	26.26	137.68	167.33
Total unit cost	381.92	299.17	427.59	276.10	690.40	622.45

Table 19 reveals that, the unit cost of HIV positive outpatient was Birr 629.88 and HIV negative outpatient costs was Birr 383.87 and it was found that statistically significant ($p < 0.05$) (see Appendix 6). This confirms that total outpatient unit cost of HIV positive patients was greater than the total outpatient unit cost of HIV negative groups.

Table 19. Total outpatient unit cost: an alternative

	HIV Positive			HIV Negative		
	Low cost	High cost	Average	Low cost	High cost	Average
Drug cost	287.15	335.61	311.38	97.42	122.64	110.03
Investigation cost	182.56	302.69	242	196.04	214.15	205
Overhead cost	76.50	76.50	76.50	68.84	68.84	68.84
Total unit cost	346.21	624	**629.88**	332.52	305.63	**383.87**

Figure 4



4.3.3 Percentage of total hospital budget that is needed to cover total cost of HIV positive patients.

Many of the required drugs and the necessary investigations (x-ray, laboratory tests etc) may not be available for all HIV/AIDS patients in all of the three public hospitals. So to determine the cost share of treating HIV/AIDS patients from the total hospital budget need private prices (see Table 22) in addition to public service price (see Table 20) and unit price (see Table 21).

Table 20, illustrates that the service cost share of HIV/AIDS patients from the total budget in Tikur Anbessa hospital was 8%, Zewditu hospital 16% and St. Paul's hospital 3 %. But when these public services were estimated using private prices, the share of HIV/AIDS patients from the total budget in Tikur Anbessa hospital increased to 28 %, in Zewditu hospital 59 % and in St. Paul's hospitals 12% (see Table 22). Therefore, the percentage HIV/AIDS patients share using private price from the total budget of the hospitals was 3 times greater than the percentage share of HIV/AIDS patients using the average public price (See Table 20). Moreover, as it is shown in Table 21, the unit cost of HIV/AIDS patients shared from the total budget of Tikur Anbessa, Zewditu and St. Paul's hospitals were 21%, 45% and 10% respectively.

Table 20. Percentage of Total Hospital Budget That is Needed to Cover Total Service Cost of HIV Positive Patients (July 2002—June 2003).

Name of health institution	Inpatient			Outpatient					
	No HIV positive patients	Average cost per patient	Cost per year	No HIV positive patients	Average cost per patient	Cost per year	Total cost per year (inpatient +outpatient cost)	Total annual budget	% share from the annual total budget
Tikur Anbessa Hospital	1,416	1,134	1,605,744	607	585	355,095	1,960,839	26,014,395.98	8
Zewditu Hospital	810	1,134	918,540	360	585	210,600	1,129,140	7,042,488.59	16
St. Paul's Hospital	342	1,134	387,828	156	585	91,260	479,088	14,090,247.70	3

Table 21. Percentage of Total Hospital Budget that is needed to Cover Total Unit Cost of HIV Positive Patient (July 2002—June 2003).

Name of health institution	Inpatient			Outpatient					
	No HIV positive patients	Average cost per patient	Cost per year	No HIV positive patients	Average cost per patient	Cost per year	Total cost per year (inpatient +outpatient cost)	Total annual budget	% share from the annual total budget
Tikur Anbessa Hospital	1,416	3,643	5,158,488	607	629.88	382,337	5,540,825	26,014,395.98	21
Zewditu Hospital	810	3,643	2,950,830	360	629.88	226,757	3,177,587	7,042,488.59	45
St. Paul's Hospital	342	3,643	1,245,906	156	629.88	98,261	1,344,167	14,090,247.70	10

Table 22. Percentage of Total Hospital Budget That is Needed to Cover Total Cost of HIV Positive Patients (Applying Private Service Prices) (July 2002—June 2003).

Name of health institution	Inpatient			Out patient					
	No HIV positive patients	Average cost per patient	Cost per year	No HIV positive patients	Average cost per patient	Cost per year	Total cost per year (inpatient +out patient cost)	Total annual budget	% share from the annual total budget
Tikur Anbessa Hospital	1,416	4,614	6,533,424	607	1,072	650,704	7,184,128	26,014,395.98	28
Zewditu Hospital	810	4,614	3,737,340	360	1,072	385,920	4,123,260	7,042,488.59	59
St. Paul's Hospital	342	4,614	1,577,988	156	1,072	167,232	1,745,220	14,090,247.70	12

CHAPTER FIVE

D I S C U S S I O N AND ANALYSIS OF THE MAJOR FINDINGS

The hospital costs of 453 patients (293 HIV positive, 160 HIV negative) were analyzed the mean length of stay of HIV/AIDS patients were 19 days and outpatient visits were 4 days. The HIV/AIDS patient service charges paid to the hospital (service cost) per admission were on average Birr 1,134 and per outpatient visits were Birr 585.41 moreover these inpatient and outpatient public services valued using private hospitals service prices the cost was Birr 4,614 and Birr 1,072 respectively. Whereas the unit cost of HIV/AIDS patients per admission were Birr 2727.51 and Birr 629.88 per outpatient visits.

There was no significance difference in cost of treatment, average length of stay and outpatient visits between HIV positive and negative patients. However at the outpatient level the unit cost of treating the HIV/AIDS patients is significantly greater than the non-HIV/AIDS patients.

These findings are similar to the result of earlier studies done in Kenya and Zaire, which also found no significant difference in costs between HIV positive and HIV negative groups (Guinness, *et.al,* 2002; Hassing, *et.al*, 1990).

This result however, differs from a study conducted in Zimbabwe in which the direct cost of treatment and lengths of stay were found to be greater for the HIV Positive category

(Hansen *et.al*, 2000). This difference might be attributed due to the fact that in Zimbabwe, during the time of the survey, the health service was relatively strong and a wide range of drugs and other supplies were readily available in public hospitals and hence the HIV/AIDS patients might not been requested to buy the drugs from private market (Hansen *et.al,* 2000).

The similar cost patterns of the two patient groups examined in this study may reflect the fact that few therapeutic options, limited and non-specific basic services are being provided to both groups of patients. In some case patients are referred back to the health centers for appropriate follow-up in their near-by facilities. For instance, the follow-up of TB patients are usually handled at health center level. Hence, the cost associated with this service should have been included in the total costs of health care provided to people with HIV/AIDS.

The similar average length of stay in hospitals for patients with and without HIV/AIDS in this result is different from the study in Kigali and in the district hospitals in Zambia, which found that patients with HIV/disease stayed longer in hospital than the other patients (Buve, 1997). Therefore the similar average length of stay between the two groups of patients in this study probably shows, those AIDS patients with terminal illness may choose to stay at home or it could be the result of pressures to limit HIV/AIDS patient stays in an over crowded hospitals. For example, the beds to population ratio in Addis Ababa are estimated to be 1:725 (ORAAMP, 2001). Similarly, in South Africa, which is experiencing the fastest growth in HIV/AIDS epidemic in the world, patients are turned away from hospitals due to limited beds (Russell, 2000).

At the outpatient level, the unit treatment cost of HIV positive patients were higher than the HIV negative groups and found to be statistically significant ($p < 0.05$). This finding concurs with an earlier study by Shewit (2002), which also found out that the unit treatment cost of HIV positive factory workers was higher than the unit treatment cost of HIV negative factory workers.

The service cost of HIV/AIDS inpatients (US $ 104.30--160.75)* in this study was almost 3 times less than the treatment cost estimates of AIDS patients in sub-Saharan Africa (US $ 300--490) (World Bank, 1997). However, the unit treatment cost of HIV/AIDS inpatients ranges from US $ 308 - 328, which is similar to treatment cost, estimates in sub Saharan Africa and it is more than 3 times the per capita in come of Ethiopia.

In all of the three public hospitals, the resource available to treat patients is known to be inadequate. Therefore, low cost per inpatient day and outpatient visits may indicate insufficient resources rather than high performance or efficient resources use.

It is important to note that this type of study relies on recorded medical history to estimate the cost. However, the accuracy and completeness of medical records in Ethiopia is open to question. This is particularly true to patients who frequently seek care from multiple systems and providers. But their medical records only show the actual charges at any institution. In other words, they do not show the care and services the patients got from other providers, such as families, friends and communities since they are not registered or

* 1 US $ = 8.56 Birr

recorded in the medical documents of the patients. In view of this, it is possible to say that the treatment cost obtained from such type of studies may be underestimated.

The utilization pattern of health services by HIV/AIDS patients also needs attention because once a patient is identified to have HIV/AIDS; some of the hospitals may not be willing to admit them as an inpatient. Even if they are admitted, they are not treated in the same way as the other patients. This is either because the health personnel are afraid of the contamination or they, think, the patients are hopeless (Abdulhamid, 1998a). These could be the reasons for lower treatment costs in case of HIV/AIDS patients.

The drug expenses of HIV/AIDS patients were higher than the non-HIV/AIDS patients but not the investigation costs, which show similar expenses. This could be due to the fact that the drugs used for treating opportunistic infections are more expensive or because HIV/AIDS patients take drugs more regularly without appropriate investigations and detecting the major causes. Although the appropriate diagnostic facilities would minimize the tendency for irrational use of drugs, the majority of health facilities do not use supportive laboratory services to monitor the progress of treatment in HIV/AIDS patients (UNAIDS 2002).

Based on the information obtained from public hospitals comparisons were made with what private health facilities are charging for the same services. Actually these comparisons of service cost of HIV positive patients were made with the expectation that private for profit hospitals would charge much higher than public hospitals.

Some of the possible reasons for higher private cost (competitive price) may be because in most instances the private health institutions have more and better supplies and equipment, better drug availability, higher salaries for health workers, and newer facilities than in the public sector. Thus introducing market and competitive elements in the public sector will improve the efficiency of public hospitals. However, the private prices are beyond most of the population's ability to pay. Only the better off would be able to afford fees for treatment in the private for-profit sectors. These realities point to the importance of developing less costly HIV/AIDS treatment alternatives.

The unit cost of treating HIV/AIDS patients in each hospital was much higher than what actually the patient paid (service cost) for the services. This shows the presence of higher subsidies in public hospitals, which makes them inefficient.

With the present high prevalence of HIV/AIDS in the country, the health workers handling patients should have the necessary facilities to prevent being infected. And incidence and occurrence of accidental exposure to blood and needle stick injury, puncture with a needle or sharp instrument that is contaminated or potentially contaminated with blood, system must allow the health workers to access ARV drug as a post exposure prophylaxis. During the survey time however, the three hospitals had no such system. Had the system existed definitely the cost on the health institution would have been immense.

The analysis of the costs of HIV associated care in public referral hospitals shows an economic impact of HIV on hospitals and the patient costs of care. It provides baseline

information to compare the costs and affordability of alternative strategies and can assist in planning.

As the prevalence of HIV is increasing, further work is required to address the gaps of costs for service provision, to find alternative models of care and greater understanding of the health-seeking behavior of HIV positive patients. This will help to understand the full amount of resources required at a national level to provide adequate care.

CHAPTER SIX

CONCLUSION and RECOMMENDATIONS

6.1. CONCLUSION

The present study revealed that there is no significant difference in costs, length of stay and outpatient visits between HIV positive and HIV negative groups among referral hospital patients. This similar cost pattern between the two groups probably reflects the limited provision of care beyond basic clinical services and inadequate appropriate follow-up particularly for HIV/AIDS patients.

However, the cost of HIV/AIDS in the public hospitals is an additional cost, which shares the meager resources available for health care and even diverts resources that might be used otherwise to the prevention of new infections and the development of more effective treatments. Hence, unless the pandemic is averted, the impact will be tremendous.

In this situation of dwindling resources and increasing demand, information on costs of the treatment and care of AIDS patients in health facilities is necessary in order to have an idea of the likely costs of the increasing number of AIDS patients. This would enable to plan effectively so that the existing health services could accommodate the need of these patients by allocation of dedicated resources for their management and treatment of the common opportunistic infections that is both adequate and affordable.

One of the most obvious consequences of HIV/AIDS patients are the increased occupancy of hospital beds (12 to 53%) and treatment affordable or otherwise is not available for many late-stage conditions of these patients. Therefore, home based care with higher level of community involvement and greater use made of existing community resources might be a response to the limitations of curative hospital-based care and treatment needs of many HIV/AIDS patients. Economic, social and psychological supports are provided to patients in their own home and to the relatives caring for them.

As a matter of course, there is no sufficient information to compare home based and hospital based care for HIV/AIDS patients in Ethiopia and concludes that one is better than the other. Both models should rather be considered as complements than substitutes for each other. It is hoped that future researchers will dwell on a comparative analysis of the two models and ascertain which one should really cheep in cost and more convenient for HIV/AIDS patients.

Further research needs to focus on the coping mechanisms that are likely to be pursued by families, communities, the health care system, and the national economy. More detailed research is required about the cost of treating HIV/AIDS patients who are at the institution of the time of data collection, to reduce record bias and avoids missing of medical records. The patient side costs such as (transport, lodging, food etc) and opportunity costs also included when patients are visiting the hospitals. This can address more or less all cost centres that needs to determine the total treatment cost of the HIV/AIDS patients. Moreover chronic diseases other than HIV/AIDS should be identified since it affects patient length of stays in the hospitals.

6.2. RECOMMENDATIONS

Based on the findings of this study the following recommendations are drawn

- Establish specific treatment units in Tikur Anbessa and St Paul's hospitals, to provide the necessary care, follow up and support to people living with HIV/AIDS.

- Expand and strengthen the existing HIV/AIDS patients follow up units in Zewditu hospital.

- Anti retro viral post exposure prophylaxis services should be given for health workers who are accidentally exposed to blood and needle stick injury.

- Promote and encourage research activities targeted towards preventive, curative and rehabilitative aspects of HIV/AIDS, this will decrease the burden of HIV/AIDS patients on health institutions.

- Promote proper institutional, home and community based health care and psychosocial support for people living with HIV/AIDS.

- Provide health care to people living with HIV/AIDS on a scheme of payment according to ability with special assistance for those who cannot afford to pay.

- More detailed research is required to establish actual costs of HIV/AIDS patients by considering the manifestations of each opportunistic infections and treatment regimen for HIV positive persons by taking in to account viral load and period since first diagnosis of HIV sero-status.

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APPENDICES

Appendix One

Operational definitions

HIV negative/non-HIV/AIDS	Blood test shows absence of antibodies against HIV.
HIV positive	Blood test shows presence of antibodies against HIV.
HIV status	Whether a person is known to be HIV positive or HIV negative.
HIV test	Blood test for antibodies against HIV.
Needle Stick injury	Refers to puncture with a needle or sharp instrument that is contaminated or potentially contaminated with blood.
Opportunistic infection	The many parasitic, bacterial viral and fungal infections which are able to cause disease in an individual once the HIV virus has damaged the immune system.
Sero-prevalence	The proportion of people testing sero-positive (e.g. for HIV) in a population at any one time.

Appendix Two

Medical Record Extraction form for HIV Positive and HIV Negative Patients on the Three Public Referral Hospitals from July 2002—June 2003.

I. Characteristics of the patient.

1. Name of health institution

A. Tikur Anbessa hospital

B. St. Paul's hospital

C. Zewditu hospital

2. Medical record number of the patient._____

3. Checklist number _____

4. Outpatient_____

5. Inpatient_____

6. Sex __

7. .Age_____

8. Place of residence: A. Addis Ababa B. Out of Addis Ababa

9. Educational status_____

10. Marital status_____

11. Occupation_____

12. Monthly income_____ (Owen or households)

13. Date of admission _____

14.Name of the ward _____

15. Class of admission

A. 1st class B. 2nd class C. 3rd class

16. HIV status _____.

17. Date of discharge _____.

18. Final diagnosis_____

19. Out come of treatment

A. Improved B. Not improved C. Dead D. Others

20. Is the patient paying?

A. Yes B. No

Date of data collection_____

II. Diagnostic tests.

1.1 Laboratory tests	Epi[a]. 1	Epi. 2	Epi. 3	Epi. 4	Epi.5	Provided by the hospital	Bought by the patient	Remark
A. Parasitic tests								
1.stool examination								
2.blood smear examination								
3.sputum staining for PCP with Modifie Gimsa or toluidine blue								
B.Hematology tests								
4.CBC complete blood count								
5. TLC. Total lymphocyte count examination								
6.ESR examination								
7. Blood morphology								
C. Bacteriology tests								
7.Gram stain examination								
8.AFB stain examination								
9.stool culture examination								
10.Blood culture examination								
11.urine culture examination								
12.sputum culture examination								
D. Fungal tests								
13.KOH examination								

[a] Episode

14.Indian ink examination								
E. Serology and viral tests								
15.Spot test examination								
16. ELISA examination								
17.VDRL examination								
18.TOXO examination								
19. Widal & wile flex examination								
20. Cryptococcus antigenimia exaxamination								
21. Blood group and RH								
22. Coombs test								
23. cholestrol								
24. Uricacid								
25. HBSAg								
F . Biochemical tests (CSF, plural fluid etc.)								
26. Glucose								
27. Protein								
28. Plural fluid analysis								
29. Plural fluid c/s								
30. plural biopsy								
31. Peritonial flild analysis								
32.Cytology								
G. Other tests								
33.Urine analysis								

34.Tuberculin examination								
35.Platlet								
36. LDH								
37. PT								
38. PTT								
39. HLD								
40. LDL								
41. ANA								
42. ASO titer								
43. T3								
44. T4								
45. TSH								
46. Rosswaller								
47. Crossmatch								
48.Rheumatod								
49. HCG test								
2.2 Radiology examinations and Ultrasound etc.								
50. CXR								
51.Ultra Sound								
52. EKG								
53. ECG								
54. ECHO								
55. CT scan								
56. Barium meal								
57. Abdominal x-ray								
58. Hip x-ray								
59. Lumbar x-ray								
60.Skull x-ray								
61. Cervical x-ray								

62. Mylography								
63. Thoracolumbar x-ray								
64. Nerve condition study								
65. PNS x-ray								
66. X-ray of Lt Ped. leg								
67.Fistulography								
68. HSG								
69. Mastoid								
70. IVP								
71.Pelvic x-ray								
72. KUB (x-ray of kidney ureter &bladder)								
73. Urethrography								

75. Thiabendazole tab.								
76. Mebendazole tab. Syrup								
77. Fansidar								
78. Pentamidine isthionate								
79. Dapson								
80. Piperazin								
81. Ketrax								
82. Chloroquin tablet								
83. Primaquin								
84. Quienin tablet								
85. Quienin injection								
86. Zentil								
87.Tinidazole tablet								
G. CNS DRUGS								
88. Chlorpromazine tablet								
89. Chlorpromazine infection								
90. Diazepam tablet								
91. Diazepam injection								
92. Calamine lotion								
93. Dephenhydramide								
94. Topical benzl benzoate								
95. Dexamethazone injection								
96. Dexamethazone tablet								
97. Amitriptyline								
98. Phenobarbitone 30mg								
99. Phenobarbitone 100mg								
H. IV FLUIDS								
90.Ringer lactate								

91. D.W of 1000ml								
92. 40% Glucose								
94. Normal saline								
95. Dextros in saline								
I . CONSTIPATING DRUG								
96. Loperamide								
97. Dipenoxylate								
98. Ducolax								
99. Bisacodyl 10mg								
J. GI (GASTRO INSESTANAL) DRUGS								
100. Antacid suspicion								
101. Antacid tablet								
102. Librax tablet								
103. Tagamet injection								
104. Cimetdin tablet								
105. Cimetdin injection								
106. Mgso4								
K. ANTI ASMATIC DRUGS								
107. Predinsolone tablet								
108. Theophedrine tablet								
109. Adrenaline injection								
110. Salbutamol tablet								
111. Aminophilline injection								
112. Hydrocortisone injection								
113. Ephedrin tablet								
114.Ventolin puff								
L. ANTI HYPERTENSION DRUG								
115. Aldomet tablet								
116.HCT tablet								

147. Lidocain								
148. Iupanino 370mg								
149. Carbaznezapin								
150.Teracortil eye ointment								
151. Ergometrin tablet								
152.Ergometrin injection								
153.Daionil 5mg tab								
154.Dopamin								
155.Spironolactane								
156.Testestrone								
157.Ciprofloxacillin 500mg								
158.Ibrufen								
159.Lopamiro vial								
160.Fibian ointment								
161.Efaverz 600mg								
162. Albendazol								
163. Halopetidol tablet								
164. Halopetidol injection								
165. Fesvit tablet								
166. KMNO4								
167. Melleril								
168. Furicin ointment								
169. Zentil syrup								
170. Fasygin								
171. Supralyn tablet								
172. Dequadin tablet								
173. Rhinex drop								
174. Benzil Benzoit lotion								
175. Celeston								
176. Atroin eye ointment1%								
177. Dexamethazone eye ointment 0.1%								

178. Gynaepl vaginal suppstory								
179. Promethazine tablet								
180. Codeinphospate syrup								
N. TYPES OF TREATMENT & SUPPLIES (MATERIALS) USED								
181. Glove								
182. Syring and needle								
183. Insuline syring								
184. Intravenous canula								
185. Catheter								
186. N.G. tube								
O. PROCEDURES								
1. NG tube feeding								
2. Catheterization								
3. Cleansing Enema								
4. O2 administration								
5. Chest tube insertion								
6. Bone marrow								
7. Plural Tap								
8. Incision and drainage								
9. Dressing								
10. Physiotrapy								
11. Hemodialysis								
12. Venotrapy								
13. Tracheotomy								
14. Blood transfusion								

Total number of OPD visits _____
Total number of inpatient day's _____

Appendix Three

A. Administrative record review form from July 2002- June 2003

Name of health institutions

a. Tikur Anbessa hospital **b. St. Paul's hospital** **c. Zewditu hospital**

	1995 E.C	Remark
1.Total number of outpatients New Repeat		
2. Total number of medical outpatient New Repeat		
3.Total number of Admission		
4.Total number of patients in medical wards		
5. Total number of medical ward inpatient days		
6. Total Number of death.		
7.Number of beds in medical wards		
8.Number of patients who had HIV test		
9.Total Number of HIV positive patients		
A. Inpatients		
B. In medial wards		
C. Outpatients		
D. Medical Outpatients		
10.Total Number of HIV negative patients		
A. Inpatients		
B. in medical wards		
C. Outpatients		
D. Medical Outpatients		
11.Total Number of inpatient days		
12.Total annual budget of the hospital		
13.Capital budget		
14.Recurrent budget		

B. Administrative record review form

Cost category	Floor space total square meter (Building)	Per square meter cost (Building)	Total cost	Working life	Total annual cost
Capital					
Buildings					
Equipments					
Vehicles					
Furniture					
Total capital costs					
Recurrent					
Personnel salary					
Supplies					
Vehicle operation and maintenance					
Building operation and maintenance					
Other					
Total recurrent costs					
Total costs					

Appendix Four

Checklist for drugs, investigations, bed and consultation service prices.

	LIST OF DRUGS	public range	private range	Remark
1	Adrenaline injection of 1 ampule			
2	Albendazol 200mg tab			
3	Aldacton 25 mg of 1 tab			
4	Aldomet 250 mg of 1 tab			
5	Allapurinol 100mg			
6	Aminophyline250 mg inj. Of 1			
7	Amitriptyline 25 mg of 1 tab			
8	Amoxcacilline 500 mg of 1 cap			
9	Ampcilline 500 mg (vials)			
10	Ampcilline 500 mg caps of 1			
11	Amphotericin B lozenge			
12	Amphotericin B systemic			
13	Anti acid tablet of 1			
14	Antiacid suspension			
15	Anti TB.(**STM, Rifampcin, INH.Ethambutol, Pyrazinamide,Pyradioxine)**			
16	Anusol supp. (antihemorrhoid) of 1 supp.			
17	ASA 300mg of 1 tablet			
18	Atropin eye ointment 1%			
19	Atropine inj of 1 ampules			
20	Augementin 375 mg of 1 tablet			
21	Augementin600mg injection			
22	Bactrim (cotrimoxazole)of 1 tab			
23	Bactrim syrup of 240 mg			
24	Benzathine pencillin1.2 iu			
25	Benzathine pencillin2.4 iu			
26	Benzyl Benzoit lotion			
27	Bisacodyl 5mg of 1 tablet			

28	Buscopan tablet			
29	CAF eye drop			
30	Calciumgluconate			
31	Calcium tablet (per sachet)			
32	Carpamazepin200 mg of 1 tab			
33	Catheter			
34	Celestone 0.5mg of 1 tablet			
35	Cepthraxin 500 mg of 1 tablet			
36	Cepthraxin 500 mg of injection			
37	Chalamine lotion			
38	Chlorampnicol 250 mg of 1 caps			
39	Chlorampnicol IV of 1 gm(vials)			
40	Chloroquin250mg of 1 tablet			
41	Chlorpromazine50 mg injection			
42	Chlorpromazine25mg of 1 tablet			
43	Cimetdin200mg of 1 ampule			
44	Cimetdin400mg of 1 tablet			
45	Ciprofloxacillin 500mg tab			
46	Clotrimazole lozenge(myconazole)			
47	Cloxacillin500 mg inj			
48	Cloxacillin500 mg of 1 tablet			
49	Codein phospate30 mg of 1 tab			
50	Codeinphospate syrup			
51	Cough syrup(Ephedex)			
52	Crystaline pencillin of 1 million			
53	D.S of 1000 ml			
54	D.W of 1000 ml			
55	Daionil 5mg(Glibenclomide)tab			
56	Daktarin oral jel			
57	Dapson			
58	Dephenhydramine (syrup)			
59	Dexamethazone 4mg injection			
60	Dexamethazone 4mg tablet			

61	Dexamethazone eye ointment			
62	Diazepam 10mg injection f 1 amp			
63	Diazepam 5mg of 1 tablet			
64	Diclofenac 50mg of 1 tab			
65	Diclofenac 75mg of 1 ampules			
66	Digoxin 0.25mg of 1 tablet			
67	Diphenoxylate			
68	Dipyrone injection (ampules)			
69	Diquadin of 1 tablet			
70	Disposablesyring&needle of 5cc			
71	Dopamin of 1 tab.			
72	Doxicycline 100mg of 1 tablet			
73	Doxorubcin 75mg			
74	Ducolax			
75	Efavervez			
76	Ephedrin tablet			
77	Epsum salt			
78	Ergometrin injection			
79	Ergometrin tablet			
80	Erythromycine 500mg of 1 tablet			
81	Essential of 1 tablet			
82	Ethumbutol			
83	Fansider 525mg of 1 tablet			
84	Fasygin			
85	Fefol tablet			
86	Ferous sulpate & folicacid			
87	Ferrous gluconate of 1 tablet			
88	Fes vit tablet			
89	Fluconazole tablet			
90	Fobain ointment(cream)			
91	Formaldehyde (bottle)			
92	Furacin ointment			
93	Gentamicine 80mg of 1ampules			

94	Gentamycin eye ointment			
95	Glove (plastic)			
96	Glove (surgical)			
97	Glucose 40% of 20ml			
98	Griselfuvivin 125mg of 1 tablet			
99	Gynazol vaginal supp of 1			
100	Haloperidol injection			
101	Haloperidol 5mg of 1 tablet			
102	HCT(Hydrochlorothiaze) tablet			
103	Heparine			
104	Hydralizine 20mg of 1 ampules			
105	Hydrocortizone100mg ampules			
106	Hydrogen per oxide(bottel)			
107	Hyoscine injection (ampules)			
108	Hysocine 20mg of 1 tablet			
109	Ibrufen 400mg of 1 tablet			
110	Indomethacine suppostory			
111	Indomethacine25mg of 1 tablet			
112	Insuline syring			
113	Intravenous canula			
114	Iron gluconate			
115	KCL 600mg of 1 tablet			
116	KCL ampule			
117	Ketakenozole200mg of 1 tablet			
118	Ketrax tablet			
119	Kmno4			
120	Lasix (furosamide20mg) inj.			
121	Lasix(furosamide40mg) tablet			
122	Lentie insuline100iu			
123	Lextanil 3mg of 1 tab			
124	Librax tablet			
125	Lidocain			
126	Loperamide			

127	Mebandazole 100m of 1 tablet			
128	Melleril			
129	Metronidazole 250mg of 1 caps			
130	Mgso4 (per sacket)			
131	Miconazole oral gel(tube)			
132	Montard insulin			
133	Mult vitamime of 1 tablet			
134	Multvitamine syrup			
135	Mycostatin (per bottle)			
136	N.S of 1000 ml			
137	Neurobion injection			
138	Neurobion tablet			
139	Nevupapin 20mg			
140	NG tube			
141	Nifedipine 20mg of 1tablet			
142	Norfloxacin 400mg of 1 tablet			
143	Nystatin cream			
144	Omprezol 20mg of 1 tablet			
145	ORS			
146	Paracteamol			
147	Penamidine isthionate			
148	Pethedine inj.			
149	Phenobarbitone 100mg tab			
150	Phenobarbitone 30mg tab			
151	Phenytoin 100mg of 1 tablet			
152	Phospate			
153	Piperazine(worm expel)			
154	Plasil (metochloropromide) inj.			
155	Plasil(metochloropromide) tablet			
156	Predinsolone 5mg of 1 tablet			
157	Primaquine 15mg of 1 tablet			
158	Procain pencillin			
159	promethazine 25mg of 1 tablet			

160	Propanol 40 mg of 1 tablet			
161	Pyarazinamide 600mg of 1 tab			
162	Quienine 300mg of 1 amp			
163	Quienine 300mg of 1 tab			
164	R.L of 1000 ml			
165	Regular insulin			
166	Rhinex drop(Xylomethazine)			
167	Salbutamol tablet			
168	Spectinomycin 2gm of injection			
169	Spironolactane 25mgtab			
170	Supralyn of 1 tab.			
171	Tagamet 200mg of 1 amp			
172	TAT 1500 iu of 1 ampule			
173	Teracort eye drop			
174	Testerone			
175	Tetracycline 250mg of 1 capsule			
176	Theophedrine tablet			
177	Thiamine			
178	Thibendazole tablet			
179	Tinidazol of 500mg of 1 tablet			
180	Topical benzl benzoate			
181	Topical liquid nitrogen			
182	Ventolin puff(Salbutamol inhaler)			
183	Vincristin 2gm of 1 vial			
184	Vit B12			
185	Vitamine B complex injection			
186	Vitamine B complex tablet			
187	Vitamine B6 tablet			
188	Vitamine C			
189	Warfarin			
190	Xyleaine			
191	Zentil 200mg of 1 tablet			
192	Zentil syrup			

INVESTIGATIONS				
X-RAY TESTS				
1	CXR			
2	Ultrasound			
3	EKG			
4	ECG			
5	ECHO			
6	Mylography			
7	Lumber x-ray			
8	Thoracolumber x-ray			
9	Cervical x-ray			
10	Nerve condition study(mylography)			
11	Skull x-ray			
12	CT scan			
13	Barium meal			
14	Abdominal x-ray			
15	Hip x-ray			
16	PNS x-ray			
17	X-ray of Lt. Ped. leg			
18	Fistulography			
20	KUB			
21	Pelvic			
22	IVP			
23	Urethrography			
24	Mastoid			
25	HSG			
26	Proctoscope			
LABORATORY TESTS				
	A. PARASITIC TESTS			
1	stool examination			
2	Blood smear exa. (B/F)			

3	Blood morphology			
4	Sputum staining for PCP with modified Gimsa or teludine blue			
	B. HEMATOLOGY TESTS			
5	CBC (Complete blood count) (WBC, Hgb. Diff)			
6	TLC (Total lymphocyte count)			
7	ESR examination			
	C. BACTERIOLOGY TESTS			
8	Gram stain examination			
9	AFB stain examination			
10	Stool culture examination			
11	Blood culture examination			
12	Urine culture examination			
13	Sputum culture examination			
	D. FUNGAL TESTS			
14	KOH examination			
15	Indian ink examination			
	E.SERLOLGY AND VIRAL TESTS			
16	Spot test examinatiom			
17	ELISA examination			
18	VDRL examination			
19	Toxo examination			
20	Widal & Wileflex examination			
21	Cryptococcus antigenima examination			
	F.BIOCHEMICAL TESTS			
22	CSFanalysis			
23	Plural fluid analysis			
24	Plural fluid biopsy			
25	Peritonial fluid analysis			
26	Total protein			
27	Glucose			
28	LFT(SGOT,SGPT,ALKphosp,Bilu.(D),Bilu.(T)			

29	RFT (BUN,Cretinin)			
30	FBS (RBS)			
31	Urine analysis (U/A)			
32	Tuberculin examination			
33	CD4 counts			
34	FNA			
35	Platlet count			
36	Blood Group & RH factor			
37	PT			
38	PTT			
39	Electrolysis			
40	LDH			
41	ASO titer			
42	HBsAg			
43	LDL			
44	HDL			
45	T3,T4,TSH			
46	Uric acid			
47	Sodium			
48	HCG			
49	Cholestrol			
50	Rhomatoid factor			
51	Bleeding time			
52	Clotting time			
53	Platlet			
54	Coombs test			
55	Cytology			
56	Crossmatch			
57	Rosswaller			
	Procedures			
1	NG tube feeding			
2	Catheterization			
3	Cleansing enema			

4	Chest tube insertion			
5	O_2 administration			
6	Bone marrow			
7	Plural tap			
8	Incision & drainage			
9	Dressing			
10	Physiotrapy			
11	Hemodialysis			
12	Venotrapy			
13	Trachiostomy			
14	Blood transfussion			
	BED'S PRICE LIST			
	1st CLASS			
	2nd CLASS			
	3rd CLASS			
	For Card fee (Consultation)			

Appendix Five

Public hospitals Unit Cost Calculations.

1. ST. PAUL'S HOSPITAL

Overhead cost (X_i)

X_1= Total furniture cost = **173017.4**

X_2 =Total equipment cost = **9433,306.04**

X_3= Total building cost (TBC)

Building floor space total square meter = 18,000

Per square meter cost = 3000 Birr[2]

TBC = 18,000x3000 = **54,000,000**

X_4= Annual recurrent cost (ARC) (excluding pharmaceutical cost) **9504568.70**

A) Inpatient

The assumption that inpatients to outpatients cost ratio are **6:1**

1. Total cost = xi X 0.6

$$= 0.6 \sum_{i=1} X_i$$

=0.6 (173,017.4+9,433,306.04+9,504,568.70+54,000,000)

= 0.6 (73110892.1)

= **43,866,535.3**

[2] This cost estimates is based on Professionals Working in Ministry of Health and Addis Ababa Health Bureau Planning Departments.

2. Annual cost of X_i=Z_i

$$Z_i = \frac{0.6X_1}{5} + \frac{0.6X_2}{10} + \frac{0.6X_3}{20} + 0.6X_4$$

$$Z_i = \frac{0.6x173,\ 017.4}{5} + \frac{0.6x9,\ 433,\ 306,\ 04}{10} + \frac{0.6x54,\ 000,000}{20} + 0.6x9,\ 504,568.70$$

$$Z_i = 20762.08 + 565998.36 + 1620000 + 5702741.22$$

$$= \underline{\mathbf{7,909,501.66}}$$

3. Share of Medical ward of $Z_i = M_i$

$$M_i = Z_i \times \frac{\text{Medical inpatient days}}{\text{Total inpatient days}}$$

$$M_i = 7909501.66 \times \frac{14319}{53042}$$

$$= \underline{\mathbf{2,135,216.\ 51}}$$

4. Share of each Medical inpatient day = B_i

$$B_i = \frac{M_i}{\text{Medical inpatient days}}.$$

$$= \frac{2,135,216.51}{14319}$$

$$= \underline{\mathbf{149.11}}$$

Therefore $\mathbf{B_i}$ is the cost of inpatient in terms of bed days.

B. Outpatient

1. Total cost of x_i X 0.1 (the rest attributable to inpatient costs)

Total cost of $x_i = 0.1 \sum_{i=1} X_i$

$= 0.1(173017.4+9,433,306.04+9504568.70+54,000,000)$

$=0.1(73110892.14)$

$=$**7,311,0892.1**

2. Annual cost of $X_i=Z_i$

$$Z_i = \frac{0.1X_1}{5} + \frac{0.1X_2}{10} + \frac{0.1X_3}{20} + 0.1X_4$$

$$Z_i = \frac{0.1x173017.4}{5} + \frac{0.1x9433,306.04}{10} + \frac{0.1x54000,000}{20} + 0.1x9504568.70$$

$Z_i = 3460.34+94333.06+270,000+950456.87$

$Z_i =$ **1,318,250**

3. Share of Medical outpatient of $Z_i = M_i$

$$M_i = Z_i \times \frac{\text{(New equivalent visits)}}{\text{Total outpatient visits}}$$

$$M_i = 1,318,250 \times \frac{18644}{66254}$$

$=$**370,958**

4. Share of each Medical outpatient Visits = O_i

$$O_i = \frac{M_i}{\text{New equivalent visits}}.$$

$$O_i = \frac{370,958}{18,644}$$

$O_i =$ **19.89**

O_i = is the cost per outpatient visits

C. Overhead Cost per Inpatient

HIV positive average inpatient days = 15

HIV negative average inpatient days = 16

Overhead cost per HIV positive inpatient stay (B_1)

Overhead cost per HIV negative inpatient stay (B_2)

a) B_1= HIV positive average inpatient days x average overhead cost

= 15x149.11= **2,236. 65**

b) B_2 =HIV negative average inpatient days x average overhead cost

= 17x149.11= **2,534. 87**

D. Overhead Cost per Medical Outpatient

HIV positive patient average outpatient visit = 4.25

HIV negative patient average outpatient visit = 2.55

Overhead cost per HIV Positive patient (O_1) =

= Costs each outpatient visit x HIV positive average outpatient visits

= 19.89x4.25=**84.53**

Overhead cost per HIV negative patient (O_2) =

= Costs each outpatient visit x HIV negative average outpatient visits =19.89 x 2.55 =**50.71**

2. ZEWDITU HOSPITAL

Overhead cost (X_i)

X_1= Total furniture cost = **912263**

X_2 =Total equipment cost = **2,756,727.86**

X_3= Total building cost (TBC)

Building floor space total square meter = 10,000

Per square meter cost = 3000 Birr

TBC = 10,000x3000=**30,000,000**

X_4= Annual recurrent cost (ARC) (excluding pharmaceutical cost) =**3,995,401.00**

A. Inpatient

1. Total cost of X_i x 0.6 (the rest is attributable to outpatient costs)

$$\text{Total cost of } X_i = 0.6 \sum_{i=1} X_i$$

$$=0.6\ (912263 + 2756727.86 + 30000000 + 3995401)$$

$$= 0.6\ (37664391.9)$$

$$= \underline{22,598,635.1}$$

2. Annual cost of X_i=Z_i

$$Z_i = \frac{0.6X_1}{5} + \frac{0.6X_2}{10} + \frac{0.6X_3}{20} + 0.6X_4$$

$$Z_i = \frac{0.\ 6x\ 912{,}263}{5} + \frac{0.6x2{,}756{,}727.86}{10} + \frac{0.6x30{,}\ 000{,}000}{20} + 0.6x\ 3{,}995{,}401$$

$$Z_i = 109{,}471.56 + 165{,}403.67 + 900{,}000 + 2{,}397{,}240.60$$

$$Z_i = \mathbf{3{,}572{,}115.\ 83}$$

3. Share of Medical ward of $Z_i = M_i$

$$M_i = Z_i \times \frac{\text{Medical inpatient days}}{\text{Total inpatient days}}$$

$$M_i = 3{,}572{,}115.83 \times \frac{(11956)}{47278}$$

$$M_i = \mathbf{903{,}342.\ 29}$$

4. Share of each Medical inpatient day = B_i

$$B_i = \frac{M_i}{\text{Medical inpatient days}}.$$

$$= \frac{903{,}342.29}{11956}$$

$$= \mathbf{75.55}$$

There fore $\mathbf{B_i}$ is the cost of inpatient in terms of bed days.

B. Outpatient

1. Total cost of X_i x 0.1 (the rest is a locatable to inpatient cost)

$$\text{Total cost of } X_i = 0.1\sum_{i=1} x_i$$

$$= 0.1(37664391.9)$$

$$= \underline{\mathbf{3766439.19}}$$

2. Annual cost of $X_i = Z_i$

$$Z_i = \frac{0.1X_1}{5} + \frac{0.1X_2}{10} + \frac{0.1X_3}{20} + 0.1X_4$$

$$Z_i = \frac{0.1x912263}{5} + \frac{0.1x2756727.86}{10} + \frac{0.1x30000000}{20} + 0.1x39995401$$

$$Z_i = 18245.26+27567.27+150,000+399540.1$$

$$= \underline{\mathbf{595,352.63}}$$

3. Share of Medical outpatient of $Z_i = M_i$

$$M_i = Z_i \times \frac{\text{New equivalent visits}}{\text{Total outpatient visits}}$$

$$M_i = 595352.63 \times \frac{6667}{55037}$$

$$= \underline{\mathbf{72,111}}$$

3. TIKURANBESSA HOSPITAL

Overhead cost (X_i)

X_i = Total furniture cost = **387,518.08**

X_2 = Total equipment cost = **32,727,455.30**

X_3= Total building cost (TBC) =

Building floor space total square meter = 45,000

Per square meter cost = 3,000 Birr

TBC= 45000x3000=**135,000,000.00**

X_4= Annual recurrent cost (ARC) (excluding pharmaceutical cost) = **18,868,169**

A. Inpatient

1. Total cost of X_i x 0.6 (the rest attributable to outpatient visits)

$$\text{Total cost } X_i = 0.6 \sum_{i=1} X_i$$

= 0.6 (387,518.08+32,727,455.30+135,000,000 +18,868,169)

= 0.6 (186,983,142)

= **112,189,885**

2. Annual cost of X_i=Z_i

$$Z_i = \frac{0.6X_1}{5} + \frac{0.6\,X_2}{10} + \frac{0.6X_3}{20} + 0.6X_4$$

$$Z_i = \frac{0.6 \times 387518.08}{5} + \frac{0.6 \times 32727455.30}{10} + \frac{0.6 \times 135,000,000}{20} + 0.6 \times 18868169$$

Z_i = 46,502.16 + 1,963,647.32 +4,050,000 + 11,320.901.4

Z_i = **17,381,050. 9**

3. Share of medical ward of Z_i=

$$M_i = Z_i \times \frac{\text{Medical inpatient days}}{\text{Total inpatient days}}$$

$$M_i = 17,381,050.9 \times \frac{43653}{169,565}$$

M_i = **4,474,596. 85**

4. Share of each Medical inpatient day = B_i

$$B_i = \frac{M_i}{\text{Medical inpatient days}}$$

$$B_i = \frac{4,474,596.85}{43,653}$$

B_i = **102. 50**

B. **Outpatient**

1. Total cost=$0.1 \sum_{i=1} X_i$ (the rest is attributable to inpatient)

$= 0.1(387518.08 + 32727455.30 + 135000,000 + 18868169)$

$= 0.1(186983142)$

$= \mathbf{18698314.2}$

2. Annual cost of X_i=

$$Z_i = \frac{0.1X_1}{5} + \frac{0.1X_2}{10} + \frac{0.1X_3}{20} + 0.1X_4$$

$$Z_i = 0.1 \times \frac{387518.08}{5} + 0.1 \times \frac{32727455.30}{10} + 0.1 \times \frac{135,000,000}{20} + 0.1 \times 18868169$$

$Z_i = 7750.36 + 327274.55 + 675,000 + 1886816.90$

$Z_i = \mathbf{2,896,841.81}$

3. Share of medical outpatient of $Z_i = M_i$

$$M_i = Z_i \times \frac{\text{New equivalent visits}}{\text{Total outpatient visits}}$$

$$M_i = 2896841.81 \times \frac{28458}{95727}$$

$M_i = \mathbf{861,181.52}$

4. Share of each medical outpatient visits = O_i

$$O_i = \frac{M_i}{\text{New equivalent visits}}$$

$$O_i = \frac{861,181.52}{28,458}$$

$= \mathbf{30.26}$

C. Average overhead cost per inpatient

HIV positive average inpatient day = 19

HIV negative average inpatient day = 21

Average overhead cost per inpatient day = 153.75

a. Average overhead cost per HIV positive inpatient=102.50 x 19=1947.50

b. Average overhead cost per HIV negative inpatient= 102.50 x 21=2152.50

D. Overhead Cost per Medical Outpatient

Average outpatient visit HIV positive = 4.55

Average outpatient visit HIV negative = 5.53

Cost per medical outpatient visit = 30.26

a. Overhead cost per HIV positive patient = 30.26 x 4.55= **137. 68**

b. Overhead cost per HIV negative patient = 30.26 x 5.53= **167. 33**

Hospitals Average Overhead Cost by HIV Status of Patients

Name of health institution	Inpatient				Outpatient			
	HIV positive overhead cost	HIV negative overhead cost	No of HIV positive patient	No of HIV negative patients	HIV positive overhead cost	HIV negative overhead cost	No of HIV positive patient	No of HIV negative patient
St. Paul's Hospital	2236.65	2534.87	48	26	84.53	50.71	20	11
Zewditu Hospital	1737.65	1586.55	68	36	46.37	26.26	68	30
Tikur Anbessa Hospital	1947.50	2152.50	58	42	137.68	167.33	31	15

The Total Combined Average Overhead Costs of the Three Public Hospitals

1. Inpatient

1.1 HIV Positive

$$= \frac{(48x2236.65) + (1737.65 \times 68) + (1947.50 \times 58)}{48+68+58}$$

$$= \frac{107359.20 + 118160.2 + 112955}{174}$$

$$= \frac{338474.40}{174}$$

$$= \mathbf{1945.25}$$

1. 2 HIV Negative

$$= \frac{(36x1586.55) + (26x2534.87) + (42x2152.50)}{36+26+42}$$

$$= \frac{57115.80+65906.62+90405}{104}$$

$$= \frac{213427.42}{104}$$

$$= \mathbf{2052.18}$$

2. Outpatient

2.1 HIV Positive

$$= \frac{(84.13x20) + (68x46.37) + (31x137.68)}{20+68+31}$$

$$= \frac{1,682.60+3,153.16+4,268.08}{119}$$

$$= \frac{9,103.84}{119}$$

$$= \mathbf{76.50}$$

2.2 HIV Negative

$$= \frac{(11x50.71) + (30x26.26) + 15x167.33}{11+30+15}$$

$$= \frac{557.81 + 787.80 + 2,509.95}{56}$$

$$= \frac{3,855.56}{56}$$

$$= \mathbf{68.84}$$

Appendix Six

Test statistics
Non- parametric tests
Willcoxon- Mann- Whitney test
Stat Xact-4

Variable	Mean rank		Value mann-whitney statistic	One sided p-value
Inpatient service cost				
	HIV positive	HIV negative		
Total cost public low	127.07	126.92	7267	0.4950
Total cost public high	125.19	130.40	6961	0.2948
Total cost private low	123.98	132.66	6762	0.1843
Total cost private high	122.73	135.00	6556	0.1021
Out patient service cost				
Total cost public low	222.16	205.42	$2.250e^{004}$	0.0938
Total cost public high	219.95	209.74	$2.186e^{004}$	0.2108
Total cost private low	219.35	210.91	$2.169e^{004}$	0.2530
Total cost private high	219.74	210.16	$2.180e^{004}$	0.2254
Inpatient days and outpatient visits				
Inpatient days	131.03	145.91	7659	0.0661
Outpatient visits	217.03	215.96	$2.110e^{004}$	0.4499
Drugs				
Total drug cost public low	237.79	207.24	$2.660e^{004}$	0.0088
Total drug cost public high	235.36	211.69	$2.589e^{004}$	0.0329
Total drug cost private low	234.75	212.80	$2.571e^{004}$	0.0440
Total drug cost private high	233.74	214.67	$2.541e^{004}$	0.0492
Investigations				
Total investigation cost public low	220.12	238.14	$2.150e^{004}$	0.0804
Total investigation cost public high	220.23	237.95	$2.153e^{004}$	0.0839
Total investigation cost private low	223.83	231.37	$2.258e^{004}$	0.2786
Total investigation cost private high	226.73	226.88	$2.343e^{004}$	0.4797
Inpatient unit cost				
Total unit cost public low	135.29	146.54	8316	0.1296
Total unit cost public high	140.67	150.67	8897	0.1280
Outpatient unit cost				
Total unit cost public low	92.89	77.61	5370	0.0000
Total unit cost public high	105.13	51.61	3914	0.0313